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(54) SWING GIRDER AND SCAFFOLD SYSTEM WITH SUCH SWING GIRDER AND A METHOD OF ERECTING THE SCAFFOLD SYSTEM

(57) A swing girder (10) for use in a scaffold system of the ring scaffold type including standards (12, 112) having, arranged at regular distances, ring-shaped rosettes (14) with coupling recesses (18), the swing girder including a top-girder (20), a bottom-girder (22) and a number of connecting tubes (24) which interconnect the top-girder(20) and the bottom-girder (22) with each other. Further, the swing girder is provided with two fixed rosette couplings (26, 34) at a first end and with a swing connector assembly (38) comprising two pivotable rosette couplings (40, 48) connected with a second end of the swing girder in a manner pivotable around a pivoting axis (S). A lower of the two pivotable rosette couplings is a pivotable girder-support coupling (48) which includes a support plate (50) with positioning pin (52). The positioning pin is receivable in a coupling recess of the rosette which supports the support plate. Further, a scaffold system and a method of erecting such a scaffold system are described.

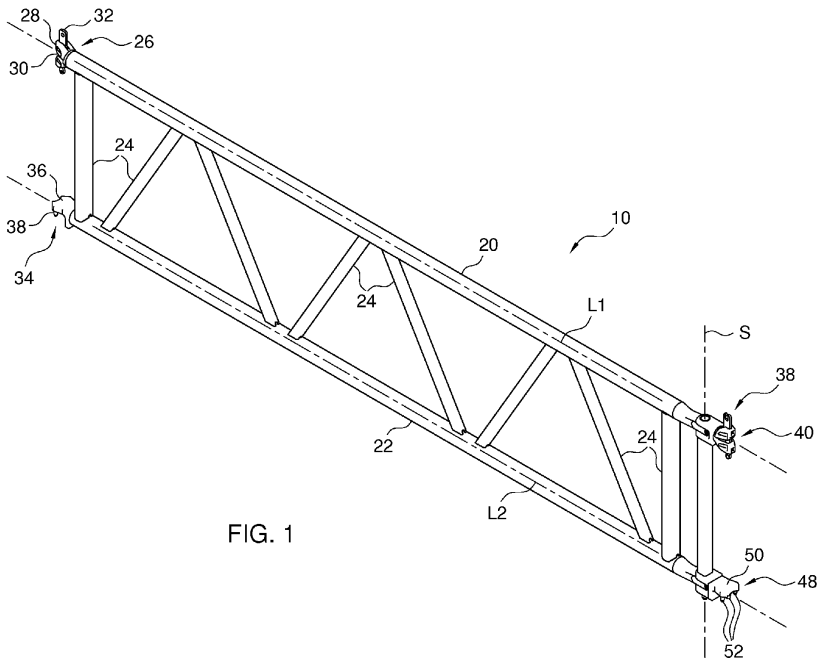

FIG. 1

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Description

FIELD

[0001] The invention relates to a swing girder, a scaffold system with such a swing girder and a method of erecting a scaffold system. More particularly, the invention relates to a swing girder that is suitable for application in a scaffold system where the scaffolds are provided at regular distances with ring-shaped rosettes having coupling recesses. Such a scaffold system is marketed by Scafom-rux under the brand name Ringscaff.

BACKGROUND

[0002] The Ringscaff system of Scafom-rux is described extensively in "The Ringscaff erection manual complete" of May 2011, downloadable via this link: http://www.scafom-rux.com/uploads/documents/Handleidingen/2011-05-01-The-Ringscafferection-manual-complete.pdf and the content of which is understood to be incorporated herein by reference, which, inter alia on p. 73, accurately describes the configuration of the rosettes with coupling recesses, which rosettes are connected with the standards at regular distances. Further, on p. 74, the body, implemented as a casting, of a fixed ledger-wedge coupling is described, and described on p. 77 is the design of the wedge which is movably connected with the body of the ledger-wedge coupling. Page 72 shows a plan view and a side view of a node point where five horizontal ledgers are attached with a ledger-wedge coupling to the annular rosette of a standard.

[0003] CA 02740549 shows in Figure 3 a horizontal girder of the fixed type of which a lower girder coupling is not a wedge coupling but a coupling with a downwardly extending pin which can be inserted into an opening of a rosette of a standard.

[0004] WO 2013/066859 A1 shows in Figure 3 a horizontal swing girder. The known swing girder has the features described in the pre-characterizing portion of claim 1. In the known swing girder, the two fixed rosette couplings are implemented as conventional ledger-wedge couplings of which the body implemented as a casting is fixedly connected, by welding, with the respective first ends of the top tube and the bottom tube of the swing girder. The swing connector assembly of the known swing girder is implemented as two conventional ledger-wedge couplings of which the body implemented as a casting is pivotably connected via a bracket with the respective second ends of the top tube and the bottom tube of the swing girder.

[0005] A swing girder is intended to enable erection of cantilever platforms or of suspended platforms, allowing the platform to be created from an already erected scaffold, for example, for forming a working platform under a bridge or roof construction.

SUMMARY

[0006] A disadvantage of the known swing girder is that it is cumbersome to mount, so that mounting is time consuming and also brings safety risks. When the known swing girder is to be attached to a standard, two scaffolders should work together. This is because the swing girder has to be held by a first scaffolder while by a second scaffolder the lower pivotable ledger-wedge coupling is slid onto a rosette and the wedge is placed through a coupling recess in the rosette. These operations have to be done about 0.5 meters below the level of the floor which the scaffolder is on, so that, actually lying on the scaffold floor, he has to position the pivotable ledger-wedge coupling concerned and then place the wedge and strike it. Next, the second scaffolder can also position the upper pivotable ledger-wedge coupling by tilting the swing girder and by pivoting the upper pivotable ledger-wedge coupling relative to the associated rosette into the correct position so that the wedge can be placed through a coupling recess. After this, with the aid of a hammer, both wedges can be struck to fixedly connect the pivotable ledger-wedge couplings with the standard concerned.

[0007] The invention contemplates a swing girder that can be connected with a standard more easily, more particularly, if so desired, can be connected with a standard by just one scaffolder.

[0008] To this end, the invention provides a swing girder according to claim 1. More particularly, the invention provides a swing girder for use in a scaffold system of the ring scaffold type including standards having, arranged at regular distances, ring-shaped rosettes with coupling recesses. The swing girder according to the invention comprises:

- an upper chord or top-girder of which a top-girder axis extends in a swing girder plane in a swing girder main direction;
- a lower chord or bottom-girder of which a bottom-girder axis L2 extends parallel to the swing girder main direction in the swing girder plane;
- a number of connecting tubes which interconnect the top-girder and the bottom-girder with each other;
- two fixed rosette couplings, which are fixedly connected respectively with a first end of the top-girder and a first end of the bottom-girder;
- a swing connector assembly which comprises two pivotable rosette couplings which are connected respectively with a second end of the top-girder and a second end of the bottom-girder in a manner pivotable around a pivoting axis S.

[0009] The swing girder is characterized, according to the invention, in that a lower of the two pivotable rosette couplings is a pivotable girder-support coupling which includes a support plate extending perpendicular to the swing girder plane and the pivoting axis, which is con-

nected with the second end of the bottom-girder in a manner pivotable around the pivoting axis, wherein the pivotable girder-support coupling includes at least one positioning pin connected with the support plate, which is at a side of the support plate facing away from the top-girder.

[0010] Assembling a swing girder according to the invention may, if so desired, be carried out by a single scaffolder. The scaffolder places the at least one positioning pin of the pivotable girder-support coupling in a coupling opening of a rosette of a standard, with the support plate resting on the rosette, so that a large part of the weight of the swing girder at that moment is taken up by the respective rosette. The scaffolder can carry out this operation while standing. In any case, the scaffolder does not need to reach about 0.5 meters below the scaffold floor to perform the operation there and so does not need to lie down as described above in the discussion of the disadvantages of the known swing girder. Assembling the swing girder according to the invention is therefore more favorable from an ergonomic viewpoint. Moreover, assembly of the swing girder according to the invention can be carried out much faster because fewer operations are required. Moreover, as the scaffolder does not need to lie down or get down on his knees to carry out operations about 0.5 meters below the scaffold floor, he himself can continue to support the swing girder, so that a second scaffolder need not necessarily be present during placement of the swing girder according to the invention. After positioning of the girder-support coupling on a lower-situated rosette, the scaffolder proceeds to tilt the swing girder into a position in which the swing girder plane extends substantially vertically. The higher-situated rosette can then be simply coupled with the upper of the two pivotable rosette couplings.

[0011] The swing connector assembly further comprises a connecting rod which connects the two pivotable rosette couplings with each other, so that the two pivotable rosette couplings always have the same pivoted position around the pivoting axis relative to the swing girder plane. This in contrast to the swing girder known from WO 2013/066859 A1 where pivotable rosette couplings are connected with the top-girder and bottom-girder pivotably independently of each other. The effect achieved by the connecting rod is that the pivoted position of the two pivotable rosette couplings is always the same relative to the swing girder plane. This, in turn, simplifies coupling of the upper pivotable rosette coupling with a rosette because the upper coupling automatically has the right pivoted position after placement of the at least one positioning pin of the lower pivotable rosette coupling in a coupling recess of the associated rosette. Moreover, the connecting rod effects a better distribution of the forces on the two pivotable rosette couplings and the rosettes coupled thereto during mounting and swinging of the swing girder. This is of importance because during mounting and swinging of the swing girder, the interplay of forces on the rosette couplings and the rosettes connected therewith is different than in the eventually mounted condition of the swing girder. The effect achieved by the connecting rod is that the forces on the two pivotable rosette couplings and the two rosettes connected therewith are approximately equally distributed.

[0012] The invention also provides a scaffold system according to claim 9. Such a scaffold system comprises:

- standards which are provided at regular distances with ring-shaped rosettes which are each provided with coupling recesses;
- ledgers which are provided at the ends with ledger-wedge couplings, each ledger-wedge coupling comprising a body provided with a receiving gap in which a ring-shaped rosette is receivable and each ledger-wedge coupling including a wedge which is movably connected with the body of the ledger coupling and which can be inserted through a coupling recess in the ring-shaped rosette and be struck for fixation and for forming a force-transmitting connection between the ledger and the standard; and
- swing girders according to the invention, with the distance between the top-girder and the bottom-girder of the swing girder substantially corresponding to the distance between two neighboring rosettes on the standards.

[0013] Such a scaffold system provides the possibility of erecting a cantilever platform with the aid of swing girders in a simple manner. The platform may then be realized by a single scaffolder. This in contrast to prior art scaffold systems with swing girders.

[0014] Finally, the invention provides a method of erecting a suspended platform according to claim 14. More particularly, the method according to the invention comprises:

- providing a scaffold system according to the combination of claims 12 and 13;
- stably setting up the pair of first standards utilizing either the suspension means thereof or the base jacks thereof and interconnecting the first standards of the pair with at least one ledger;
- connecting the swing connector assembly of the first swing girder with a first of the pair of first standards;
- attaching a hanging standard provided with suspension means to the fixed girder-support coupling and the fixed girder-wedge coupling of the first swing girder;
- connecting the swing connector assembly of the second swing girder with a second of the pair of first standards;
- attaching a hanging standard provided with suspension means to the fixed girder-support coupling and the fixed girder-wedge coupling of the second swing girder;
- swinging out the first swing girder and the second swing girder, and placing the diagonal brace for fix-

ation of the first swing girder in a position in which the main direction of the top-girder of the first swing girder extends perpendicular to the at least one ledger which connects the two standards of the pair of first standards with each other;

- placing the floor parts on the two swing girders;
- connecting the end girder with the rosettes of the two hanging standards; and
- attaching the suspension means of the two hanging standards to an overhead construction such as a bridge, roof or beam.

[0015] Such a method of erecting a platform that is at least in part suspended from an overhead construction, such as a bridge, a roof or a beam, can be carried out particularly fast and, if desired, even by a single scaffolder. This is the consequence of the particular configuration of the swing girders according to the invention which are used in carrying out the method according to the invention.

[0016] Further embodiments of the invention are described in the subclaims and will be further clarified hereinafter on the basis of an example, with reference to the drawing.

BRIEF DESCRIPTION OF THE DRAWINGS

[0017]

Fig. 1 shows a perspective view of an example of a swing girder;

Fig. 2 shows a side view of the example of a swing girder represented in Figure 1, which is mounted between two standards;

Fig. 3 shows the swing connector assembly of the swing girder shown in Figure 1, in more detail in perspective;

Fig. 4 shows an example of an end girder;

Fig. 5 shows detail V of Figure 4;

Fig. 6 shows the first mounting operation of coupling the swing connector assembly of a swing girder with a standard;

Fig. 7 shows a conventional scaffold with a swing girder attached to the left-hand standard of the scaffold, the upper girder-wedge coupling fixed with a wedge;

Fig. 8 shows that a hanging standard has been mounted at the other end of the swing girder and thereupon safety ledgers have been mounted to the hanging standard;

Fig. 9 shows that a second swing girder has been attached to the right-hand standard of the conventional ring scaffold and that a diagonal brace has been arranged between a rosette of the first hanging standard and a rosette of the right-hand standard of the conventional ring scaffold;

Fig. 10 shows that the floor parts have been placed on the swing girders;

Fig. 11 shows that the end girder has been mounted as well as two safety ledgers which bound a remote end of the suspended platform; and

Fig. 12 shows a detail of an upper part of the suspension means and the associated fastening means for attachment to an overhead construction, in particular an I-beam.

DETAILED DESCRIPTION

[0018] The invention provides a swing girder 10 for use in a scaffold system of the ring scaffold type including standards 12, 112 having, arranged at regular distances, ring-shaped rosettes 14 (see Figure 2 and Figures 7-11) with coupling recesses 18 (see, for example, Figure 12). In most general terms, the swing girder 10, of which an example is shown in Figures 1 and 2, comprises an upper chord or top-girder 20 of which a top-girder axis L1 extends in a swing girder plane in a swing girder main direction, as well as a lower chord or bottom-girder 22 of which a bottom-girder axis L2 extends parallel to the swing girder main direction in the swing girder plane. The top-girder 20 and the bottom-girder 22 are mutually interconnected by a number of connecting tubes 24. The swing girder 10 has two fixed rosette couplings 26, 34 which are fixedly connected respectively with a first end of the top-girder 20 and a first end of the bottom-girder 22. Further, the swing girder 10 has a swing connector assembly 38 which comprises two pivotable rosette couplings 40, 48 which are connected respectively with a second end of the top-girder 20 and a second end of the bottom-girder 22 in a manner pivotable around a pivoting axis S. According to the invention, a lower of the two pivotable rosette couplings 40, 48 is a pivotable girder-support coupling 48 which includes a support plate 50, extending perpendicular to the swing girder plane and the pivoting axis, which is connected with the second end of the bottom-girder 22 in a manner pivotable around the pivoting axis (see Figure 3). The pivotable girder-support coupling 48 includes at least one positioning pin 52, connected with the support plate 50, which is on a side of the support plate 50 facing away from the top-girder 20.

[0019] The advantages of a thus-implemented swing girder have already been described hereinabove in the section of the description headed "Summary" and which is referred to here.

[0020] In an embodiment, of which an example is shown in the figures (see in particular Figure 3), the swing connector assembly 38 may further comprise a connecting rod 54 which connects the two pivotable rosette couplings 40, 48 with each other, so that the two pivotable rosette couplings 40, 48 always have the same pivoted position around the pivoting axis S relative to the swing girder plane. As already indicated above under the heading "Summary", such a connecting rod provides the advantage that the forces exerted on the pivotable rosette couplings and the associated rosettes during mounting and pivoting of the swing girder 10 are distributed better

over the two pivotable rosette couplings 40, 48 and the associated rosettes 14.

[0021] In an embodiment, of which an example is shown in the figures (see Figure 3), an upper of the two second rosette couplings 40, 48 can be a pivotable girder-wedge coupling 40 comprising a body 42 which is connected with a second end of the top-girder 20 in a manner pivotable around a pivoting axis, wherein the pivoting axis S extends in the swing girder plane and extends perpendicular to the top-girder axis L1, wherein the body 42 of the pivotable girder-wedge coupling 40 includes a receiving gap 44 which extends perpendicular to the swing girder plane and the pivoting axis S, and wherein the pivotable girder-wedge coupling 40 includes a wedge 46 which is movably connected with the body 42 of the pivotable girder-wedge coupling 40, wherein the pivotable girder-wedge coupling 40 provides a force-transmitting connection with a standard 12 when the wedge 46 is in a fixation condition.

[0022] A thus-implemented upper pivotable rosette coupling 40 provides for simple assembly. After the pivotable girder-support coupling 48 has been placed by way of the positioning pin 52 on a rosette 14 and rests thereon, the scaffolder can tilt the swing girder 10 into a vertical position (see Figure 6) so that the rosette 14 with which the pivotable girder-wedge coupling 40 is to be connected, is received in the receiving gap 44. The scaffolder then only needs to place the wedge 46 in the body 42, so that it extends through a coupling recess 18 of the respective rosette 14. After this operation, the swing girder 10 cannot fall down anymore and the wedge 46 then only needs to be struck with a hammer to establish a force-transmitting connection between the girder-wedge coupling 40 and the rosette 14 and fix these relative to each other. The condition then realized is shown in Figure 7.

[0023] After the attachment of the swing connector assembly 38 of the swing girder 10 to a standard 12, the scaffolder can attach, at the end with the two fixed rosette couplings 26, 34, a hanging standard 112 having therein premounted suspension means 120-126 (see Figures 8 and 12). To enable a simple attachment of the hanging standard 112, whereby the scaffolder does not need to stoop or go down on his knees to perform operations about 0.5 meters below the scaffold floor that he is on, according to an embodiment, of which an example is shown in the figures, a lower of the two fixed rosette couplings 26, 34 can be a fixed girder-support coupling 34. To that effect, see for example Figure 1, but Figure 5, while showing the fixed rosette couplings of an end girder 72, is also illustrative of this. Also this fixed girder-support coupling 34 then includes a support plate 36 extending perpendicular to the swing girder plane, which is fixedly connected with a first end of the bottom-girder 22. The girder-support coupling 34 then includes at least one positioning pin 38 connected with the support plate, which pin is on the side of the support plate 36 facing away from a top-girder 20. In this embodiment, an upper of the two fixed rosette couplings 26, 34 is preferably implemented as a fixed girder-wedge coupling 26 which includes a body 28 which is fixedly connected with a first end of the top-girder 20. The body 28 has a receiving gap 30 which extends perpendicular to the swing girder plane. Further, the fixed girder-wedge coupling 26 includes a wedge 32 which is movably connected with the body 28 of the fixed girder-wedge coupling 26. The fixed girder-wedge coupling 26 provides a force-transmitting connection with a standard 12 when the wedge 32 is in a fixation condition.

[0024] When connecting a hanging standard 112 with the thus-implemented fixed rosette couplings 26, 34, a lower rosette 114 is first brought under the support plate 36 and moved up, so that the positioning pin 38 is received in the coupling recess of the lower rosette 114. Then, the scaffolder tilts the hanging standard 112 into a vertical position so that the higher-situated rosette 114 is received in the receiving gap 30 of the fixed girder-wedge coupling 26. Next, the scaffolder only needs to place the wedge 32 in the body 28 so that it extends through the coupling recess of the respective rosette 114. The hanging standard 112 now cannot fall anymore. To realize a fixed, force-transmitting connection, the scaffolder only needs to strike the wedge 32 in place with the aid of a hammer and the hanging standard 112 is fixedly connected with the swing girder 10. After these operations, the situation in Figure 8 has been reached.

[0025] In an embodiment, of which a example is shown in the figures, the pivotable girder-wedge coupling 40 may, as is clearly visible in Figures 1-3, comprise a U-shaped bracket 56 which includes two bracket legs 56a and a bracket body 56b. The bracket body 56b is fixedly connected with the body 42 of the pivotable girder-wedge coupling 40. In this embodiment, also the pivotable girder-support coupling 48 comprises a U-shaped bracket 58 which includes two bracket legs 58a and a bracket body 58b. The bracket body 58b is fixedly connected with the support plate 50 of the pivotable girder-support coupling 48. The earlier-mentioned connecting rod 54 interconnects the two U-shaped brackets 56, 58.

[0026] In a further elaboration of this embodiment, of which an example is shown in the figures, the top-girder 20 and the bottom-girder 22 may each be tubular. The second end of the top-girder 20 may then be received between the legs 56a of the U-shaped bracket 56 of the pivotable girder-wedge coupling 40. The second end of the bottom-girder 22 may then be received between the legs 58a of the U-shaped bracket 58 of the pivotable girder-support coupling 48. The two second ends of the top-girder 20 and the bottom-girder 22 may then be each provided with a hole which forms a passage. The swing connector assembly 38 can comprise a hinge pin 60 (see Figure 2) which extends along the pivoting axis S through the bracket legs 56a, 58a and the passages of the two second ends to form the pivotable connections between the body 42 of the pivotable girder-wedge coupling 40 and the top-girder 20 and between the support plate 50 of the pivotable girder-support coupling 48 and the bot-

tom-girder 22. The hinge pin 60 then forms the pivot of the swing connector assembly 38.

[0027] In an embodiment, of which an example is shown in the figures, the hinge pin 60 can extend through the connecting rod 54 which connects the pivotable girder-wedge coupling 40 with the pivotable girder-support coupling 48. The connecting rod 54 protects the hinge pin 60 from damage, for example when the swing girders 10 are stacked onto each other for storage.

[0028] In an embodiment, of which an example is shown in the figures, the at least one positioning pin 38, connected with the support plate 36 of the fixed girder-support coupling 34, and being on the side of the support plate 36 facing away from the top-girder 20, can comprise three positioning pins 38 (see Figure 1, in which one of the three positioning pins is visible).

[0029] Three positioning pins 38 provide for a stable positioning of the support plate 36 of the fixed girder-support coupling 34 relative to the rosette 14 on which the support plate 36 rests, in that each positioning pin 38 can be received in an associated coupling recesses 18 or in that, for example, outer positioning pins 38 abut against the circumferential edge of a coupling opening.

[0030] In an embodiment, of which an example is shown in the figures, the at least one positioning pin 52 connected with the support plate 50 of the pivotable girder-support coupling 48, and being on the side of the support plate 50 facing away from the top-girder 20, can comprise three positioning pins 52 (see also Figure 1, in which these three positioning pins 52 are visible).

[0031] Three positioning pins 52 can effect a more defined positioning of the support plate 50 relative to a rosette 14, for instance because each positioning pin 52 extends through a coupling opening 18 of the respective rosette 14. This minimizes the chance of the support plate 50 shifting relative to the rosette 14 during swinging of the swing girder 10, and forces that the support plate 50 exerts on the rosette 14 can be properly transmitted.

[0032] The invention also provides a scaffold system which comprises standards 12, 112 which are provided at regular distances with ring-shaped rosettes 14 which are each provided with coupling recesses 18. The scaffold system also comprises ledgers 62 which are provided at the ends with ledger-wedge couplings 64. As is known per se from, for example, the above-mentioned "Ringscaff erection manual complete", each ledger-wedge coupling comprises a body which is provided with a receiving gap in which a ring-shaped rosette 14 is receivable, and each ledger-wedge coupling 64 includes a wedge which is movably connected with the body of the ledger coupling 64 and which can be inserted through a coupling recess 18 in the ring-shaped rosette 14 and be struck for fixation and for forming a force-transmitting connection between the ledger 62 and the standard 12. The scaffold system is characterized according to the invention by swing girders 10 according to the invention, various embodiments of which have been described hereinabove. The distance between the top-girder 20 and the bottom-girder 22 of the swing girder 10 substantially corresponds to the distance between two neighboring rosettes 14 or 14' on the standards 12 or 112. With the aid of such a scaffold system, a suspended platform can be built in a rapid and user-friendly manner. If desired, such a suspended platform can even be realized by a single scaffolder.

[0033] In an embodiment, of which an example is shown in the figures, the scaffold system may further include at least one end girder 72. An example of the end girder 72 is shown in detail in Figures 4 and 5. Such an end girder 72 comprises a upper chord or top-girder 74 of which a top-girder axis L3 extends in an end girder plane in an end girder main direction. Further, the end girder 72 comprises a lower chord or bottom-girder 76 of which a bottom-girder axis L4 extends parallel to the end girder main direction in the end girder plane. The top-girder 74 and the bottom-girder 76 are mutually interconnected by a number of connecting tubes 78. Further, the end girder 72 is provided with two end girder wedge couplings 80 which each include a body 82 which is fixedly connected with a first and a second end of the top-girder 74, respectively. Just as with a ledger-wedge coupling known per se, each body 82 is provided with a receiving gap 84. This receiving gap 84 extends perpendicular to the end girder plane. Each end girder wedge coupling 80 furthermore includes a wedge 86 which is movably connected with the body 82 of the end girder wedge coupling 80. Each end girder wedge coupling 80 provides a force-transmitting connection with a standard 112 connected therewith when the wedge 86 is in a fixation condition. Finally, the end girder 72 is provided with two end girder support couplings 88 each including a support plate 90 which extends perpendicular to the end girder plane and is fixedly connected with a first and a second end of the bottom-girder 76, respectively. Each end girder support coupling 88 includes at least one positioning pin 92 connected with the support plate 90 and which is on a side of the support plate 90 facing away from the top-girder 74.

[0034] In an embodiment, of which an example is shown in the figures, the scaffold system (see Figure 11) comprises, for forming a suspended platform, at least two swing girders 10, 10' according to any one of claims 3-8. That is, swing girders 10, 10' provided at a first end with a fixed girder-support coupling 34 and a fixed girder-wedge coupling 26 and provided at the second end with a pivotable girder-support coupling 48 and a pivotable girder-wedge coupling 40. Further, the scaffold system may include at least one end girder 72 as described above and a pair of first standards 12, 12' which are each provided with either suspension means or a base jack 70 for supporting the respective standard 12, 12'. Base jacks 70 are known per se from the "Ringscaff erection manual complete" already mentioned above. With each standard 12, 12' of the pair of first standards, a swing connector assembly 38, 38' of an associated swing girder 10, 10' of the two swing girders may be connected. The scaffold system according to this embodiment may fur-

ther comprise two hanging standards 112, 112' which are provided with suspension means for attaching the two hanging standards 112, 112' to an overhead construction, such as a bridge, a roof or a beam. Each of the two hanging standards 112, 112' is then connected with the fixed girder-support coupling 34, 34' and the fixed girder-wedge coupling 26, 26' of an associated swing girder 10, 10' of the two swing girders 10, 10'. Furthermore, each end of the end girder 72 is connected with one of the hanging standards 112, 112'. Finally, this embodiment of the scaffold system comprises floor parts 94 which rest on and extend transversely to the two swing girders 10, 10'.

[0035] In an embodiment, of which an example is shown in the figures, this embodiment of the scaffold system may include a diagonal brace 96 (see Figure 9) which connects a rosette 114 of a hanging standard 112 as mentioned with a rosette 14' of standard 12' of the pair of first standards 12, 12' mentioned. The length of the diagonal brace 96 is such that in mounted condition of the diagonal brace 96, the main direction of the top-girder 20 of the swing girder 10 that is connected with the respective hanging standard 112 extends perpendicular to the ledger 62 which extends between the two standards 12, 12' of the pair of first standards 12, 12'.

[0036] In an embodiment, of which an example is shown in the figures (see in particular Figures 8 and 12), the suspension means of a hanging standard 112 can comprise a rod 120 which is provided with outer thread and which extends through the hanging standard 112. Further, the suspension means 120-134 in this embodiment comprise a supporting nut 122 which in mounted condition supports an underside of the hanging standard 112. A first lock nut 124 locks the position of the supporting nut 122 on the rod 120. The suspension means further comprise a rotatable turnbuckle 126 which is provided with inner thread by which it is connected with an upper end of the rod 120. With the aid of a second lock nut 128, the position of the rotatable turnbuckle 126 on the rod 120 is locked. Finally, the suspension means comprise fastening means 130, 132, 134 with which the rotatable turnbuckle 126 is rotatably connected and which are configured for attachment of the rotatable turnbuckle 126 to an overhead structure such as a bridge or roof or beam. The fastening means 130-134 can comprise, for example, a suspension eye 130 through which a suspension rod 132 has been passed. The suspension rod 132 can be connected using clamps 134 with, for example, an I-beam, as shown in Figure 12. It will be clear that other types of fastening means for connecting the turnbuckle 126 with an overhead construction are also possible. The suspension eye 130, the suspension rod 132 and the clamps 134 as shown merely serve as examples. With the aid of the turnbuckle 126 which is rotatably connected with the fastening means, in the example shown being rotatably connected with the suspension eye 130, the height of the suspended scaffold platform to be created can be set, so that the platform can be properly horizontally aligned.

[0037] The invention also provides a method of erecting a suspended platform. The various steps of the method are shown in the exemplary Figures 6-12. The method comprises:

- providing a scaffold system according to the combination of claims 12 and 13, that is, a scaffold system of which various embodiments have been described hereinabove and which in any case comprises: two of the described swing girders 10, 10', a pair of first standards 12, 12', two hanging standards 112, 112', suspension means 120-134, a diagonal brace 96, and a horizontal ledger 62.

The method further comprises:

- stably setting up the pair of first standards 12, 12' utilizing either the suspension means thereof or the base jacks 70 thereof and mutually connecting the first standards 12, 12' of the pair with at least one ledger 62;
- connecting the swing connector assembly 38 of the first swing girder 10 with a first 12 of the pair of first standards 12, 12' (see Figures 6 and 7);
- attaching a hanging standard 112 provided with suspension means to the fixed girder-support coupling 34 and the fixed girder-wedge coupling 26 of the first swing girder 10 (see Figure 8);
- connecting the swing connector assembly 38' of the second swing girder 10' with a second 12' of the pair of first standards 12, 12' (see Figure 9);
- attaching a hanging standard 112' provided with suspension means to the fixed girder-support coupling 34' and the fixed girder-wedge coupling 26' of the second swing girder 10' (see Figure 9);
- swinging out the first swing girder 10 and the second swing girder 10', and placing the diagonal brace 96 for fixation of the first swing girder 10 in a position in which the main direction of the top-girder 20 of the first swing girder 10 extends perpendicular to the at least one ledger 62 which connects the two standards 12, 12' of the pair of first standards with each other (see Figure 9);
- placing the floor parts 94 on the two swing girders 10, 10' (see Figure 10);
- connecting the end girder 72 with the rosettes 114, 114' of the two hanging standards 112, 112' (see Figure 11); and
- attaching the suspension means 120-134 of the two hanging standards 112, 112' to an overhead construction such as a bridge, roof or beam (see Figure 12).

[0038] All these operations can be carried out without the scaffolder needing to perform any operations for which he has to reach about 0.5 meters below the scaffold floor he is on. It is possible, if so desired, for all these

operations to be carried out by a single scaffolder. Moreover, the operations can be carried out relatively quickly because, compared with the known swing girder, there is only half the number of girder-wedge couplings to be positioned, wedges to be placed and struck with a hammer.

[0039] To enhance safety further, in an embodiment of the method, of which an example is shown in the figures, the method can further comprise:

- prior to the swinging out of a first and second swing girder 10, 10', connecting with the hanging standards 112, 112' at least one safety ledger 140, 140' to a rosette 114, 114' which is above the rosettes 114, 114' with which the respective swing girder 10, 10' is connected with the hanging standard 112, 112' (see Figure 8);
- after swinging out of the respective swing girder 10, 10', connecting the at least one safety ledger 140, 140' with a rosette 14, 14' of the standard 12, 12' of the pair of first standards 12, 12' with which the respective swing girder 10, 10' is connected.

[0040] This way, therefore, the safety ledgers 140, 140' can be arranged directly, even before swinging out the swing girder 10, 10', so that before the floor parts 94 are placed, the safety ledgers 140, 140', such as, for example, a safety ledger at knee height and a safety ledger 140 at hip height, are already present. The safety ledgers 140, 140' are then directly available for attaching thereto a life line which scaffolders are obliged to work with during erection of a scaffold.

[0041] In an embodiment of the method, of which an example is shown in the figures, the method can further comprise:

- directly before or directly after placing of the end girder 72, attaching at least one safety ledger 142 which extends between the two hanging standards 112, 112' and which is connected with the rosettes 114, 114' of the hanging standards 112, 112' that are above the rosettes 114, 114' of the hanging standards 112, 112' with which the end girder 72 is connected.

It will be clear that this step, too, contributes to a further enhancement of safety.

[0042] In an embodiment of the method, of which an example is shown in the figures, connecting the swing connector assembly 38 of the first swing girder 10 with a first 12 of the pair of standards 12, 12' and/or connecting the swing connector assembly 38' of the second swing girder 10' with a second 12' of the pair of standards 12, 12' can comprise:

- inserting the at least one positioning pin 52 of the pivotable girder-support coupling 48 into a first rosette 14, 14' of a respective standard 12, 12' (see Figure 6);
- tilting the respective swing girder 10, 10' into a position in which the swing girder plane extends substantially vertically and an upper rosette 14, 14' is received in the receiving gap 44 of the pivotable girder-wedge coupling 40 (see Figure 6);
- inserting the wedge 46 of the pivotable girder-wedge coupling 40 through a coupling recess 18 of the upper rosette 14 and striking the wedge 46 with the aid of a hammer.

[0043] Thus connecting the swing connector assembly 38 of a swing girder 10 with a standard 12, 12' can, if desired, be carried out by a single scaffolder and provides a safe and quick way of attaching a swing girder 10, 10' to a standard 12, 12'. The activities can all be carried out by a scaffolder from a standing position, which is particularly favorable from an ergonomic viewpoint.

[0044] In an embodiment of the method, of which an example is shown in the figures, connecting the end girder 72 with the rosettes 114, 114' of the two hanging standards 112, 112' can comprise:

- inserting the positioning pins 92 of the two end girder support couplings 88 into two rosettes 114, 114' of the two hanging standards 112, 112' that are positioned at an equal level;
- tilting the end girder 72 into a position in which the end girder plane extends substantially vertically and the two upper rosettes 114, 114' of the respective hanging standards 112, 112' are received in the receiving gaps 84 of two associated end girder wedge couplings 80;
- inserting the wedge 86 of each end girder wedge coupling 80 through a coupling recess 18 of the associated upper rosette 114, 114' and striking the wedge 86 with the aid of a hammer.

[0045] This method of placing an end girder 72, too, is favorable from an ergonomic viewpoint and can be carried out by a single scaffolder.

[0046] The various embodiments described hereinabove can be used independently of each other and combined with each other in different ways. The reference numerals in the detailed description and the claims do not limit the description of the embodiments and the claims and are for clarification only.

Claims

1. A swing girder (10) for use in a scaffold system of the ring scaffold type including standards (12, 112) having, arranged at regular distances, ring-shaped rosettes (14) with coupling recesses (18), the swing girder (10) comprising:

   - a top-girder (20) of which a top-girder axis (L1)

extends in a swing girder plane in a swing girder main direction;
- a bottom-girder (22) of which a bottom-girder axis (L2) extends parallel to the swing girder main direction in the swing girder plane;
- a number of connecting tubes (24) which interconnect the top-girder (20) and the bottom-girder (22) with each other;
- two fixed rosette couplings (26, 34) which are fixedly connected respectively with a first end of the top-girder (20) and a first end of the bottom-girder (22);
- a swing connector assembly (38) which comprises two pivotable rosette couplings (40, 48) which are connected respectively with a second end of the top-girder (20) and a second end of the bottom-girder (22) in a manner pivotable around a pivoting axis (S);

characterized in that

- a lower of the two pivotable rosette couplings (40, 48) is a pivotable girder-support coupling (48) which includes a support plate (50) extending perpendicular to the swing girder plane and the pivoting axis (S) which is connected with the second end of the bottom-girder (22) in a manner pivotable around the pivoting axis (S), wherein the pivotable girder-support coupling (48) includes at least one positioning pin (52) connected with the support plate (50), which is at a side of the support plate (50) facing away from the top-girder (20);

wherein the swing connector assembly (38) further comprises:

- a connecting rod (54) which connects the two pivotable rosette couplings (40, 48) with each other, so that the two pivotable rosette couplings (40, 48) always have the same pivoted position around the pivoting axis (S) relative to the swing girder plane.

2. The swing girder (10) according to claim 1,

- wherein an upper of the two pivotable rosette couplings (40, 48) is a pivotable girder-wedge coupling (40) which includes a body (42) which is connected with a second end of the top-girder (20) in a manner pivotable around a pivoting axis, wherein the pivoting axis (S) extends in the swing girder plane and extends perpendicular to the top-girder axis (L1), wherein the body (42) of the pivotable girder-wedge coupling (40) is provided with a receiving gap (44) which extends perpendicular to the swing girder plane and the pivoting axis (S), and wherein the pivotable girder-wedge coupling (40) includes a wedge (46) which is movably connected with the body (42) of the pivotable girder-wedge coupling (40), wherein the pivotable girder-wedge coupling (40) provides a force-transmitting connection with a standard (12) when the wedge (46) is in a fixation condition.

3. The swing girder according to claim 2,
wherein a lower of the two fixed rosette couplings (26, 34) is a fixed girder-support coupling (34) which includes a support plate (36) extending perpendicular to the swing girder plane, which is fixedly connected with a first end of the bottom-girder (22), wherein the girder-support coupling (34) includes at least one positioning pin (38) connected with the support plate, which is at the side of the support plate (36) facing away from a top-girder (20); and
wherein an upper of the two fixed rosette couplings (26, 34) is a fixed girder-wedge coupling (26) which includes a body (28) which is fixedly connected with a first end of the top-girder (20), wherein the body (28) is provided with a receiving gap (30) which extends perpendicular to the swing girder plane, wherein the fixed girder-wedge coupling (26) includes a wedge (32) which is movably connected with the body (28) of the fixed girder-wedge coupling (26), wherein the fixed girder-wedge coupling (26) provides a force-transmitting connection with a standard (12) when the wedge (32) is in a fixation condition.

4. The swing girder according to claim 2 or 3,
wherein the pivotable girder-wedge coupling (40) comprises a U-shaped bracket (56) including two bracket legs (56a) and a bracket body (56b), wherein the bracket body (56b) is fixedly connected with the body (42) of the pivotable girder-wedge coupling (40),
wherein the pivotable girder-support coupling (48) comprises a U-shaped bracket (58) including two bracket legs (58a) and a bracket body (58b), wherein the bracket body (58b) is fixedly connected with the support plate (50) of the pivotable girder-support coupling (48),
wherein the connecting rod (54) interconnects the two U-shaped brackets (56, 58).

5. The swing girder according to claim 4, wherein the top-girder (20) and the bottom-girder (22) are each tubular,
wherein the second end of the top-girder (20) is received between the legs (56a) of the U-shaped bracket (56) of the pivotable girder-wedge coupling (40),
wherein the second end of the bottom-girder (22) is received between the legs (58a) of the U-shaped bracket (58) of the pivotable girder-support coupling

(48),
wherein the two second ends of the top-girder (20) and the bottom-girder (22) are each provided with a hole which forms a passage,
wherein the swing connector assembly (38) comprises a hinge pin (60) which extends along the pivoting axis (S) through the bracket legs (56a, 58a) and the passages of the two second ends for forming the pivotable connections between the body (42) of the pivotable girder-wedge coupling (40) and the top-girder (20) and between the support plate (50) of the pivotable girder-support coupling (48) and the bottom-girder (22).

6. The swing girder according to claim 5, wherein the hinge pin (60) extends through the connecting rod (54) which connects the pivotable girder-wedge coupling (40) with the pivotable girder-support coupling (48).

7. The swing girder according to any one of claims 3-6, wherein the at least one positioning pin (38) connected with the support plate (36) of the fixed girder-support coupling (34), which is at the side of the support plate (36) facing away from the top-girder (20), comprises three positioning pins (38).

8. The swing girder according to any one of claims 2-7, wherein the at least one positioning pin (52) connected with the support plate (50) of the pivotable girder-support coupling (48), which is at the side of the support plate (50) facing away from the top-girder (20), comprises three positioning pins (52).

9. A scaffold system comprising:

- standards (12, 112) which are provided at regular distances with ring-shaped rosettes (14) which are each provided with coupling recesses (18);
- ledgers (62) which are provided at the ends with ledger-wedge couplings (64), each ledger-wedge coupling comprising a body which is provided with a receiving gap in which a ring-shaped rosette (14) is receivable and each ledger-wedge coupling (64) including a wedge which is movably connected with the body of the ledger coupling (64) and which can be inserted through a coupling recess (18) in the ring-shaped rosette (14) and be struck for fixation and for forming a force-transmitting connection between the ledger (62) and the standard (12);
- swing girders (10), according to any one of the preceding claims, wherein the distance between the top-girder (20) and the bottom-girder (22) of the swing girder (10) substantially corresponds to the distance between two neighboring rosettes (14 or 14') on the standards (12 or 112).

10. The scaffold system according to claim 9, further including at least one end girder (72) which comprises:

- a top-girder (74) of which a top-girder axis (L3) extends in an end girder plane in an end girder main direction;
- a bottom-girder (76) of which a bottom-girder axis (L4) extends parallel to the end girder main direction in the end girder plane;
- a number of connecting tubes (78) which interconnect the top-girder (74) and the bottom-girder (76) with each other;
- two end girder wedge couplings (80) which each include a body (82) which is fixedly connected respectively with a first and a second end of the top-girder (74), wherein each body (82) is provided with a receiving gap (84) which extends perpendicular to the end girder plane, wherein each end girder wedge coupling (80) includes a wedge (86) which is movably connected with the body (82) of the end girder wedge coupling (80), wherein each end girder wedge coupling (80) provides a force-transmitting connection with an associated standard (112) when the wedge (86) is in a fixation condition;
- two end girder support couplings (88) which each include a support plate (90) extending perpendicular to the end girder plane, which is fixedly connected respectively with a first and a second end of the bottom-girder (76), wherein each end girder support coupling (88) includes at least one positioning pin (92) connected with the support plate (90), which is at a side of the support plate (90) facing away from the top-girder (74).

11. The scaffold system according to claim 10, which for forming a suspended platform comprises at least:

- two of said swing girders (10, 10') according to any one of claims 4-8;
- an end girder as mentioned (72);
- a pair of first standards (12, 12') which are each provided with either suspension means or a base jack (70) to support the respective standard (12, 12'), wherein with each standard (12, 12') of the pair of first standards a swing connector assembly (38, 38') of an associated swing girder (10, 10') of the two swing girders is connected;
- two hanging standards (112, 112') provided with suspension means for attaching the two hanging standards (112, 112') to an overhead construction, such as a bridge, a roof or a beam,

wherein each of the two hanging standards (112, 112') is connected with the fixed girder-support coupling (48, 48') and the fixed

girder-wedge coupling (40, 40') of an associated swing girder (10, 10') of said two swing girders,
wherein each end of the end girder (72) is connected with one of said hanging standards (112, 112'); and

- floor parts (94) which rest on and extend transversely to the two swing girders (10, 10').

12. The scaffold system according to claim 11, comprising:

- a diagonal brace (96) which connects a rosette (114) of a hanging standard (112) with a rosette (14') of standard (12') of said pair of first standards (12, 12'), and the length of which is such that in mounted condition of the diagonal brace (96) the main direction of the top-girder (20) of the swing girder (10) which is connected with the respective hanging standard (112) extends perpendicular to the ledger (62) which extends between the two standards (12, 12') of the pair of first standards (12, 12').

13. The scaffold system according to claim 11 or 12, wherein the suspension means of a hanging standard (112) comprise:

- a rod (120) which is provided with outer thread and which extends through the hanging standard (112);
- a support nut (122) which in mounted condition supports an underside of the hanging standard (112);
- a first lock nut (124) which locks the position of the support nut (122) on the rod (120);
- a rotatable turnbuckle (126) which is provided with inner thread and is therewith connected with an upper end of the rod (120);
- a second lock nut (128) which locks the position of the rotatable turnbuckle (126) on the rod (120);
- fastening means (130, 132, 134) with which the rotatable turnbuckle (126) is rotatably connected and which are configured for attachment of the rotatable turnbuckle (126) to an overhead construction such as a bridge or roof or beam.

14. A method of erecting a suspended platform, comprising:

- providing a scaffold system according to the combination of claims 12 and 13;
- stably setting up the pair of first standards (12, 12') utilizing either the suspension means thereof or the base jacks (70) thereof and interconnecting the first standards (12, 12') of the pair with at least one ledger (62);
- connecting the swing connector assembly (38) of the first swing girder (10) with a first (12) of the pair of first standards (12, 12');
- attaching a hanging standard (112) provided with suspension means to the fixed girder-support coupling (34) and the fixed girder-wedge coupling (26) of the first swing girder (10);
- connecting the swing connector assembly (38') of the second swing girder (10') with a second (12') of the pair of first standards (12, 12');
- attaching a hanging standard (112') provided with suspension means to the fixed girder-support coupling (34') and the fixed girder-wedge coupling (26') of the second swing girder (10');
- swinging out the first swing girder (10) and the second swing girder (10'), and placing the diagonal brace (96) for fixation of the first swing girder (10) in a position in which the main direction of the top-girder (20) of the first swing girder (10) extends perpendicular to the at least one ledger (62) which connects the two standards (12, 12') of the pair of first standards with each other;
- placing the floor parts (94) on the two swing girders (10, 10');
- connecting the end girder (72) with the rosettes (114, 114') of the two hanging standards (112, 112'); and
- attaching the suspension means of the two hanging standards (112, 112') to an overhead construction such as a bridge, roof or beam.

15. The method according to claim 14, comprising:

- prior to swinging out a first and second swing girder (10, 10'), connecting with the hanging standards (112, 112') at least one safety ledger (140, 140') to a rosette (114, 114') which is above the rosettes (114, 114') with which the respective swing girder (10, 10') is connected with the hanging standard (112, 112');
- after swinging out the respective swing girder (10, 10'), connecting the at least one safety ledger (140) with a rosette (14, 14') of the standard (12, 12') of the pair of first standards (12, 12') with which the respective swing girder (10, 10') is connected.

16. The method according to claim 14 or 15, comprising:

- directly before or directly after placing the end girder (72), attaching at least one safety ledger (142) which extends between the two hanging standards (112, 112') and which is connected with the rosettes (114, 114') of the hanging standards (112, 112') that are above the rosettes (114, 114') of the hanging standards (112, 112') with which the end girder (72) is connected.

17. The method according to any one of claims 14-16, wherein connecting the swing connector assembly (38) of the first swing girder (10) with a first (12) of the pair of standards (12, 12') and/or connecting the swing connector assembly (38') of the second swing girder (10') with a second (12') of the pair of standards (12, 12') comprises:

- inserting the at least one positioning pin (52) of the pivotable girder-support coupling (48) into a first rosette (14, 14') of a respective standard (12, 12');
- tilting the respective swing girder (10, 10') into a position in which the swing girder plane extends substantially vertically and an upper rosette (14, 14') is received in the receiving gap (44) of the pivotable girder-wedge coupling (40);
- inserting the wedge (46) of the pivotable girder-wedge coupling (40) through a coupling recess (18) of the upper rosette (14) and striking the wedge (46) with the aid of a hammer.

18. The method according to any one of claims 14-17, wherein connecting the end girder (72) with the rosettes (114, 114') of the two hanging standards (112, 112') comprises:

- inserting the positioning pins (92) of the two end girder support couplings (88) into two rosettes (114, 114') of the two hanging standards (112, 112') that are positioned at an equal level;
- tilting the end girder (72) into a position in which the end girder plane extends substantially vertically and the two upper rosettes (114, 114') of the respective hanging standards (112, 112') are received in the receiving gaps (84) of two associated end girder wedge couplings (80);
- inserting the wedge (86) of each end girder wedge coupling (80) through a coupling recess (18) of the associated upper rosette (114, 114') and striking the wedge (86) with the aid of a hammer.

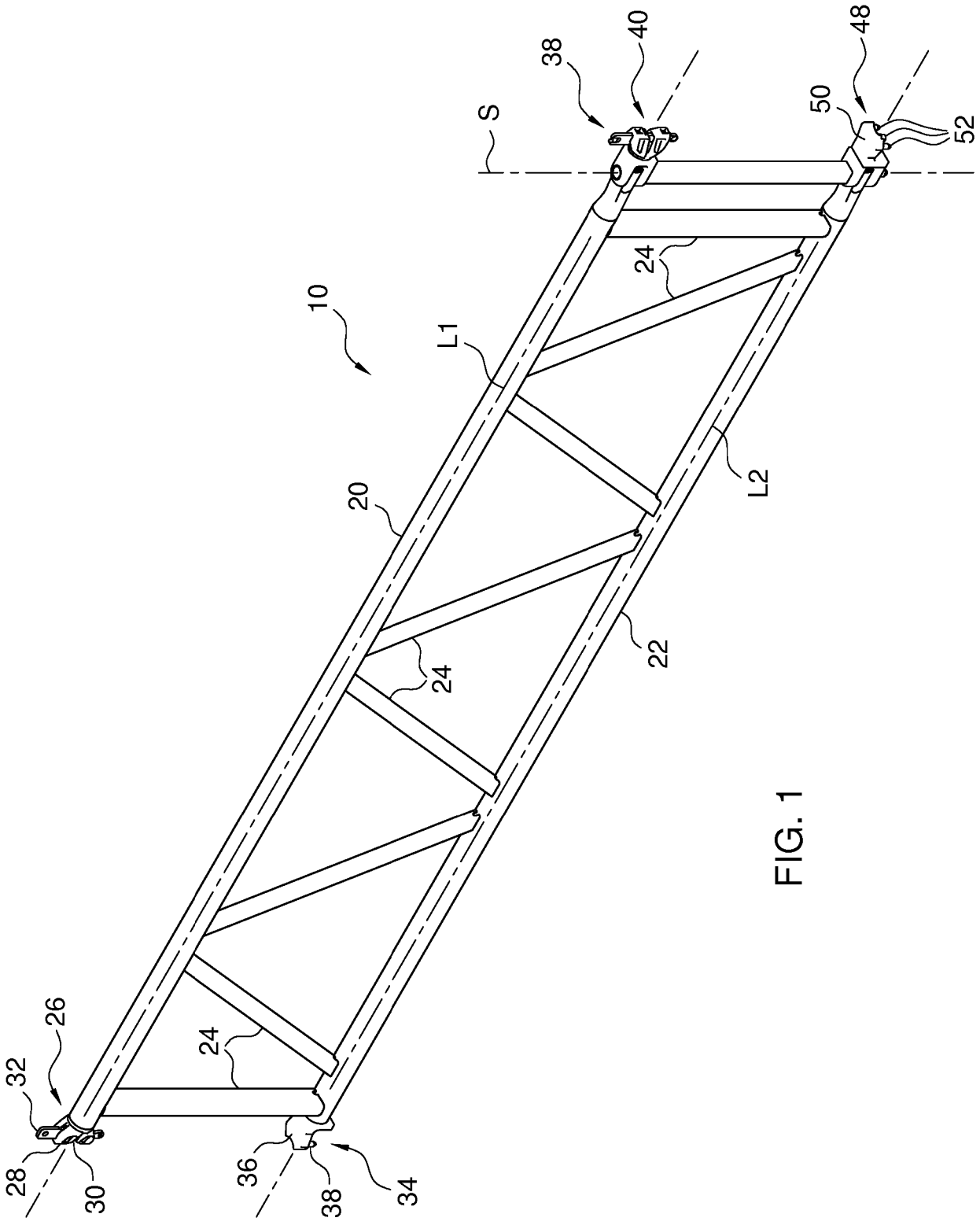

FIG. 1

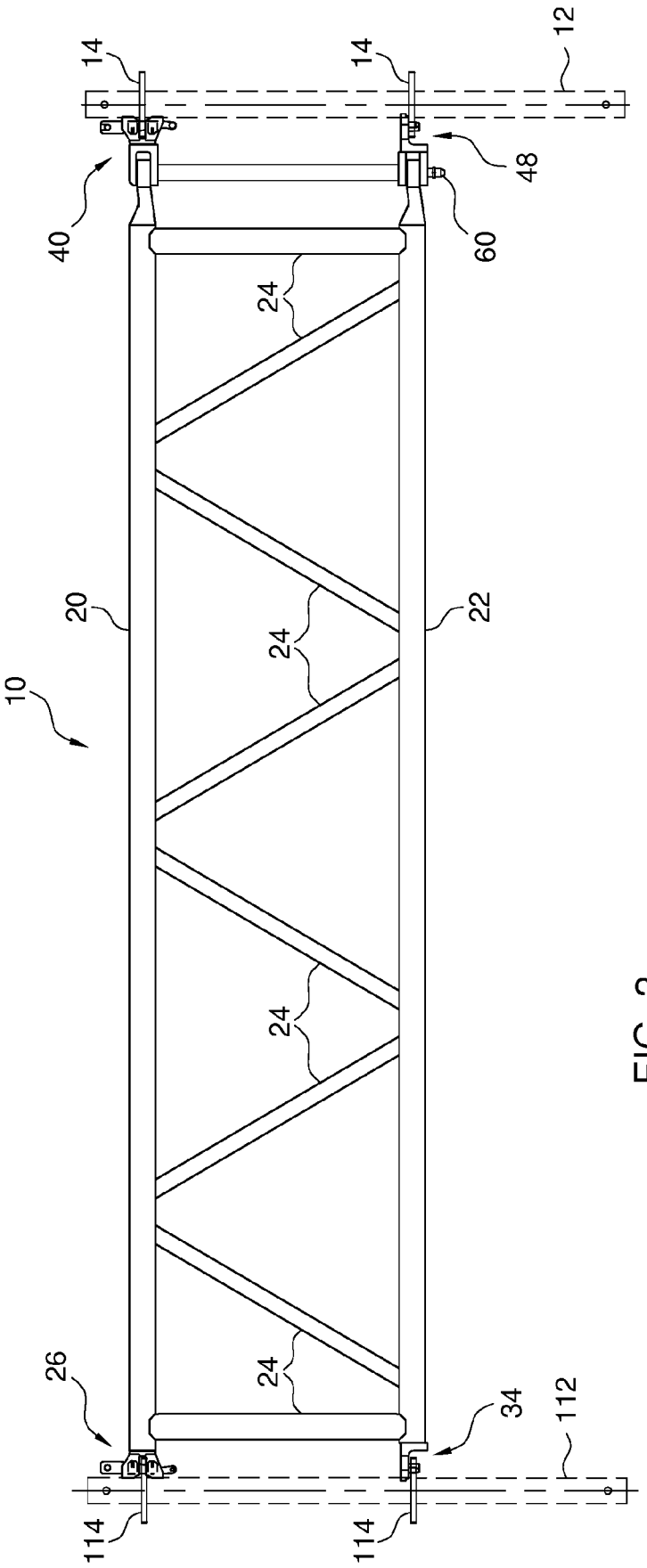

FIG. 2

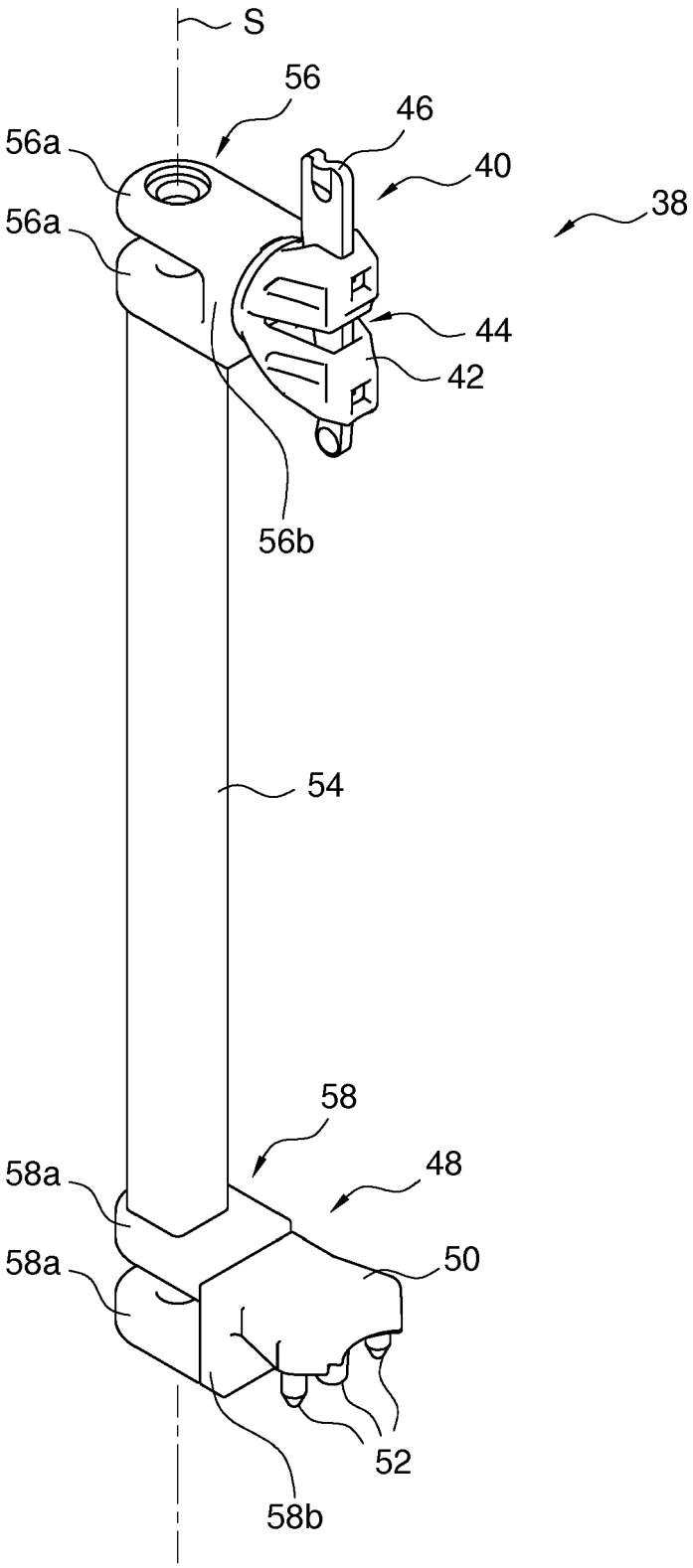

FIG. 3

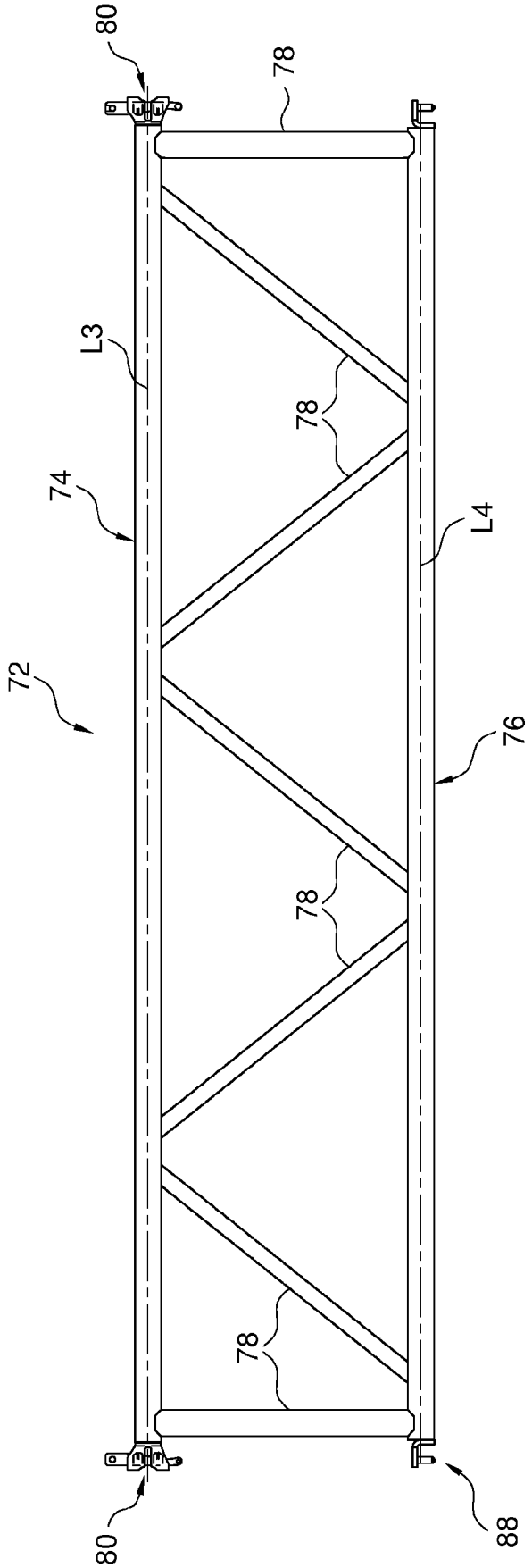

FIG. 4

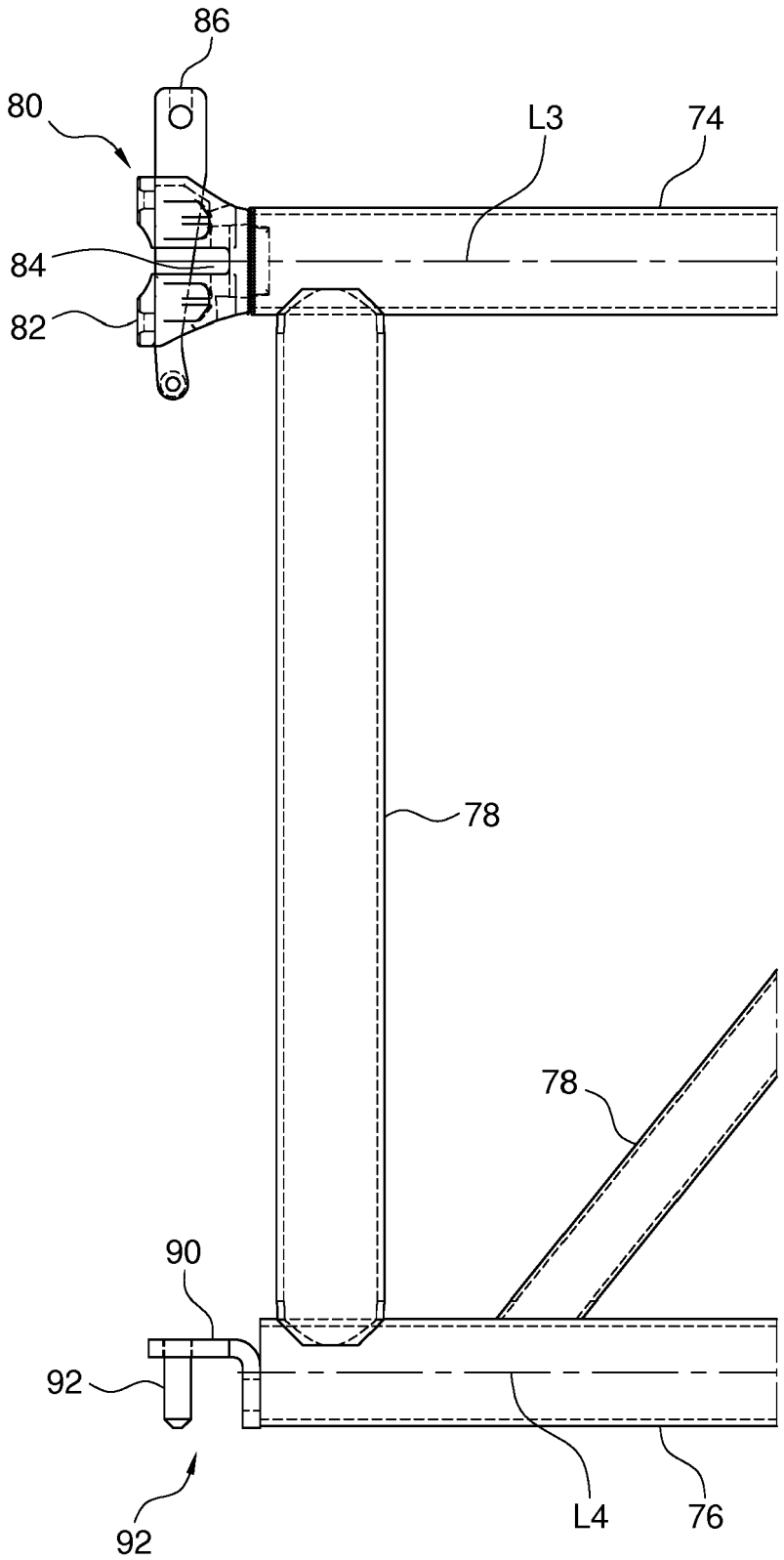

FIG. 5

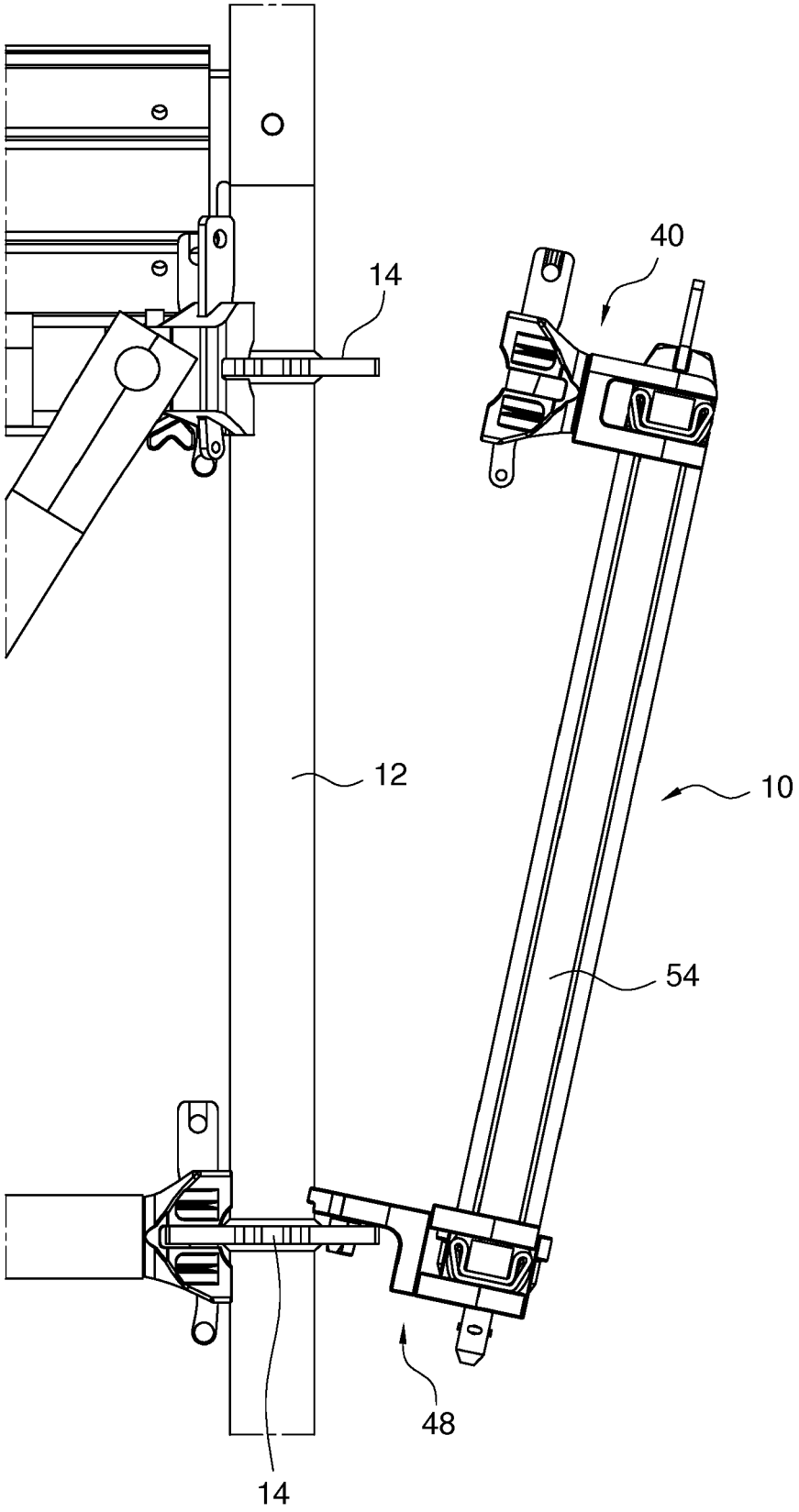

FIG. 6

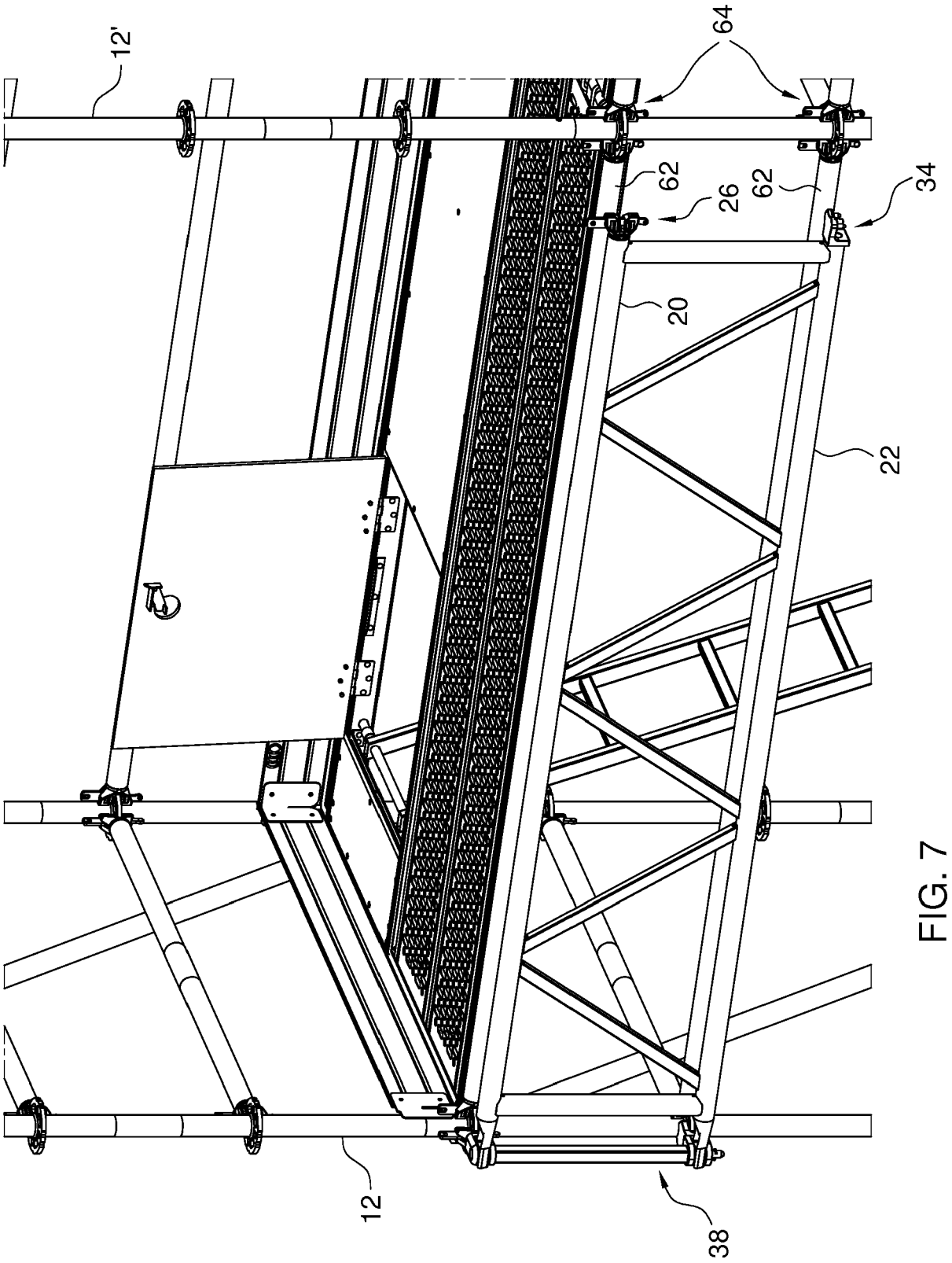

FIG. 7

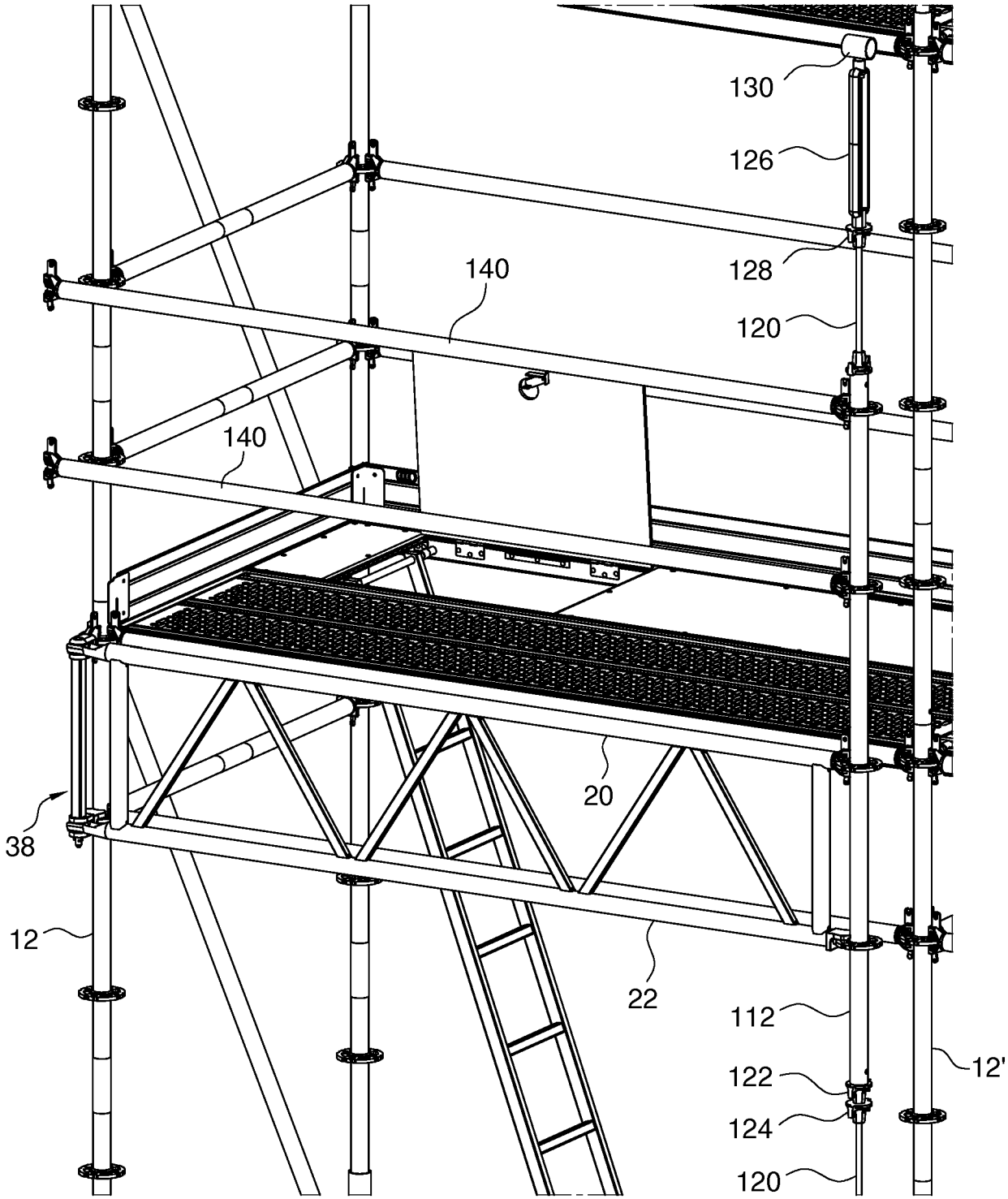

FIG. 8

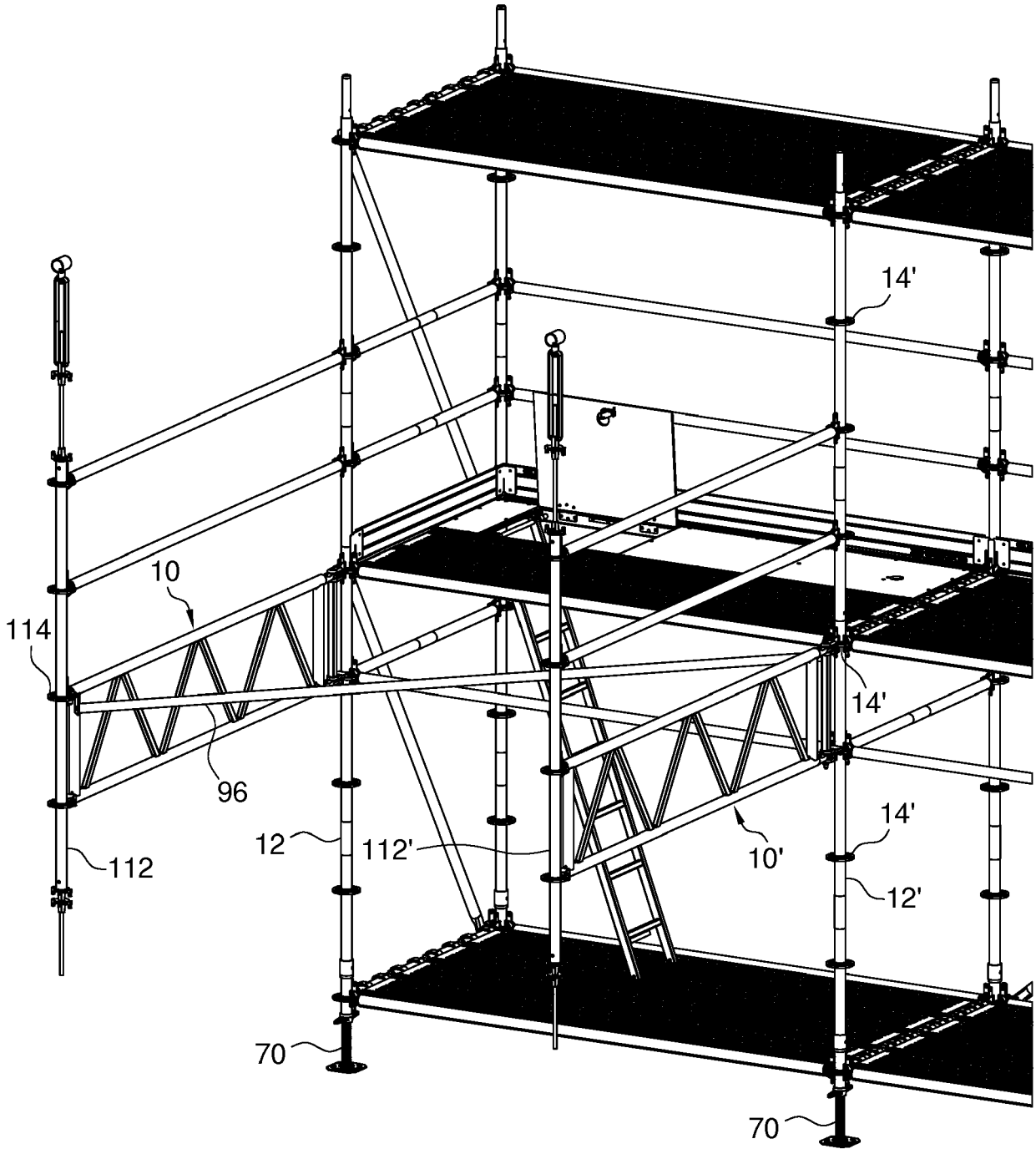

FIG. 9

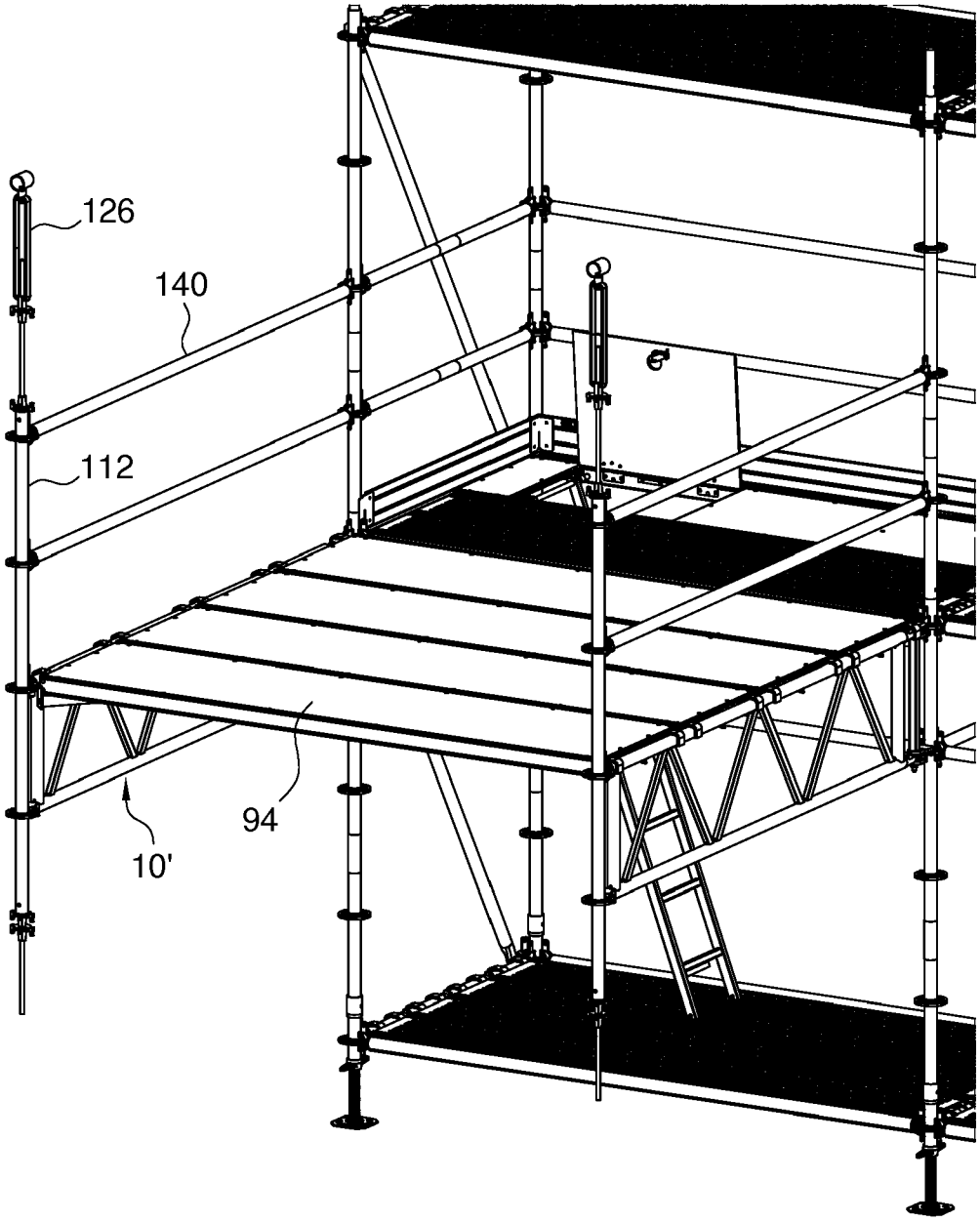

FIG. 10

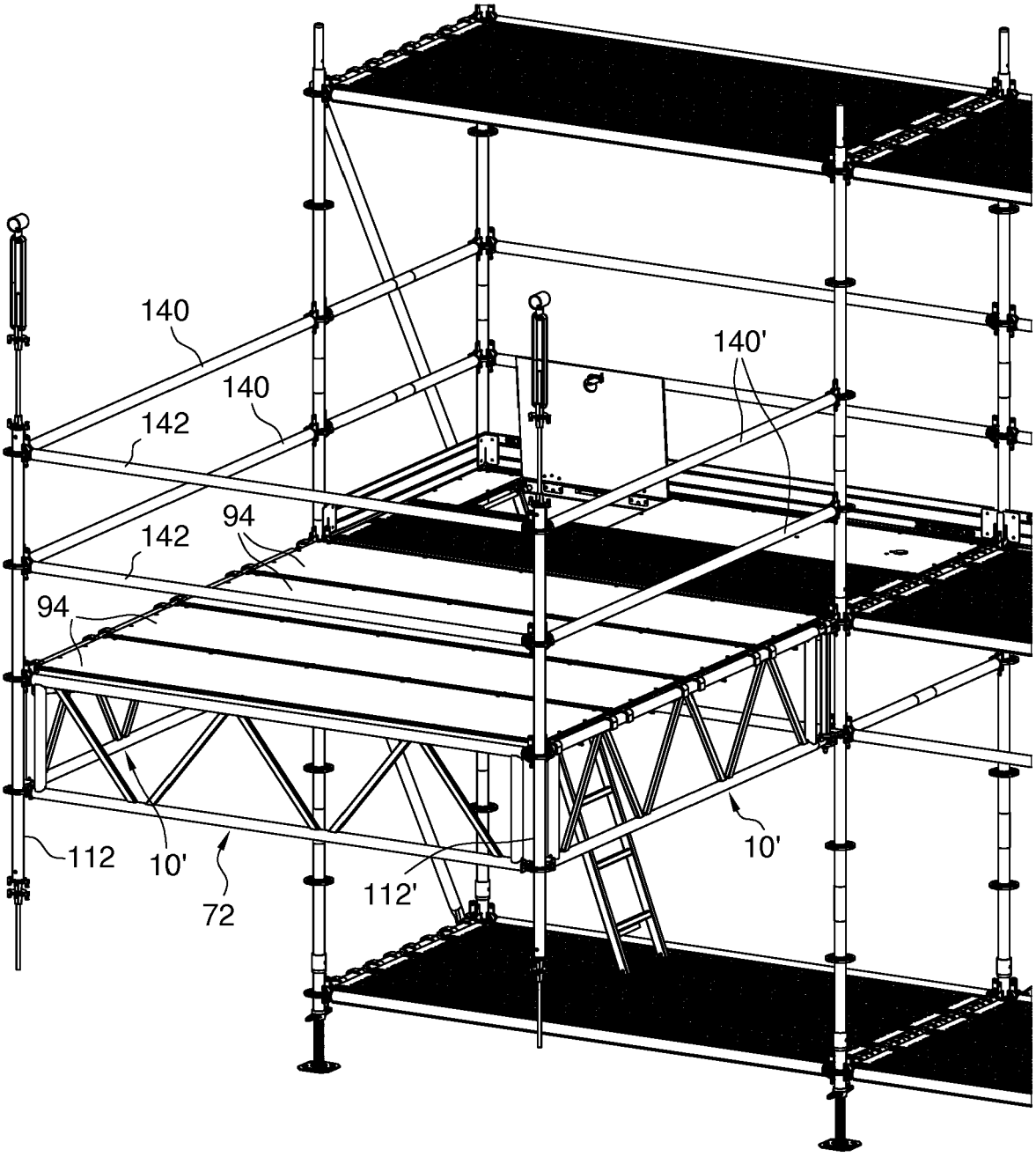

FIG. 11

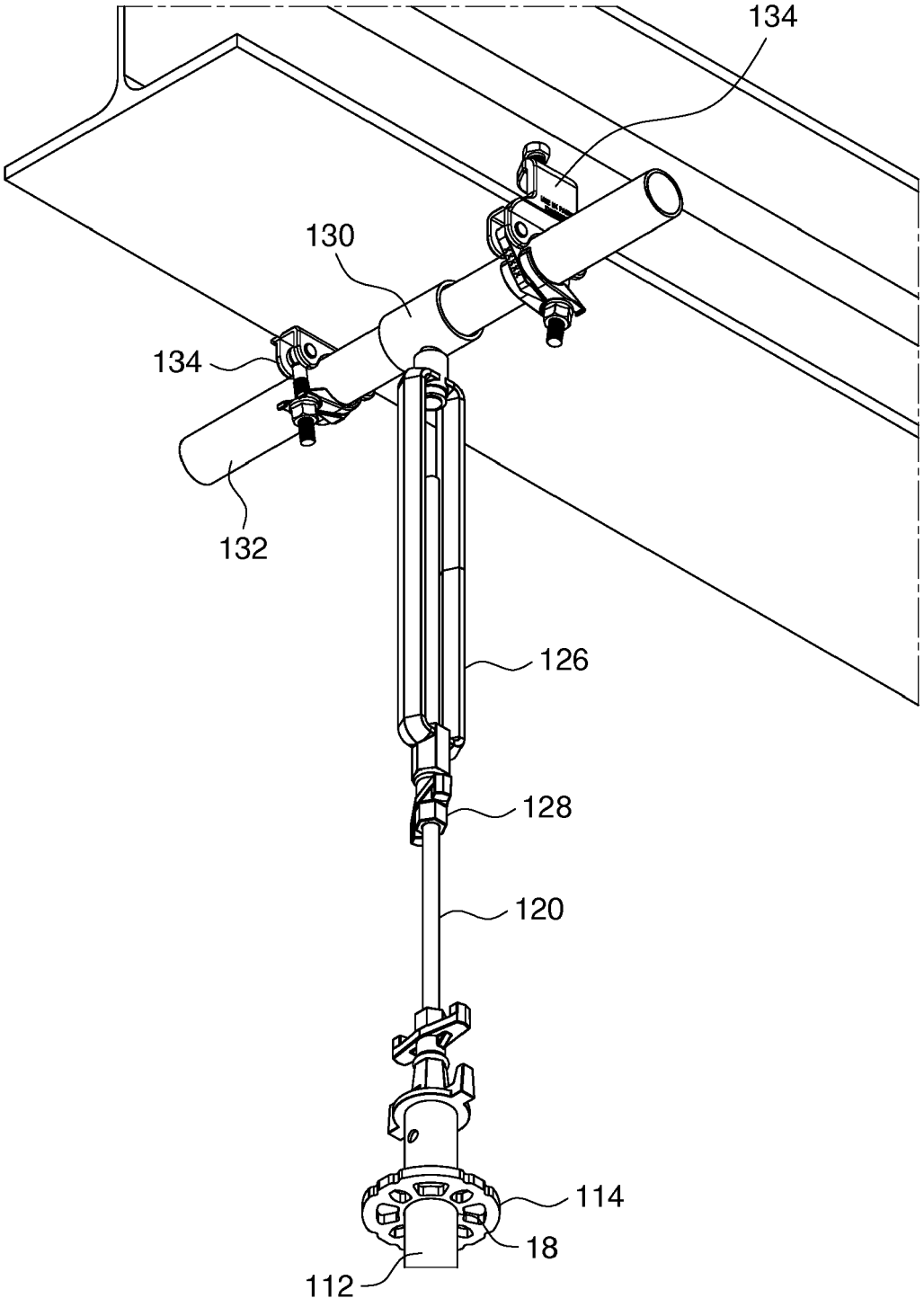

FIG. 12

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EUROPEAN SEARCH REPORT

Application Number
EP 18 16 2036

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
A,D	WO 2013/066859 A1 (SAFERITE PLATFORMS INC [US]; HAYMAN YATES W [US]; CURTIS JOHNNY [US];) 10 May 2013 (2013-05-10) * figure 3 * * page 8, line 2 - line 3 *	1-18	INV. E04G1/14 E04G5/00 E04G5/04 E04G5/06 E04G5/16 E04G7/30 E04G7/34 E04G7/32 E04G1/15 E04G1/34
A	CA 2 740 549 A1 (ATHOS CONSTRUCTION PRODUCTS INC [CA]) 17 November 2012 (2012-11-17) * figure 3 *	1-18	
A	KR 2010 0037242 A (KIM YEONG SIM [KR]) 9 April 2010 (2010-04-09) * figure 3 *	1-18	
A	US 2005/217936 A1 (JOLICOEUR PAUL [US] ET AL) 6 October 2005 (2005-10-06) * figures 6a, 6b *	1-18	

TECHNICAL FIELDS SEARCHED (IPC)

E04G

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
The Hague	23 May 2018	Tryfonas, N

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
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T : theory or principle underlying the invention
E : earlier patent document, but published on, or after the filing date
D : document cited in the application
L : document cited for other reasons

& : member of the same patent family, corresponding document

EPO FORM 1503 03.82 (P04C01)

ANNEX TO THE EUROPEAN SEARCH REPORT ON EUROPEAN PATENT APPLICATION NO. EP 18 16 2036

This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report. The members are as contained in the European Patent Office EDP file on
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23-05-2018

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