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(54) **SCAFFOLD AND METHOD FOR SUPPORTING A BRIDGE CASTING MOULD**

(57) A scaffold and a method for supporting a casting mould (7) for a reinforced concrete bridge. The scaffold (1) comprises several vertical support structures (5) and several truss structures (6) arranged side by side between the vertical support structures. The truss structures have been manufactured from wood and their ends are supported to the vertical support structures. There are no support members extending to ground (16) between the vertical support structures.

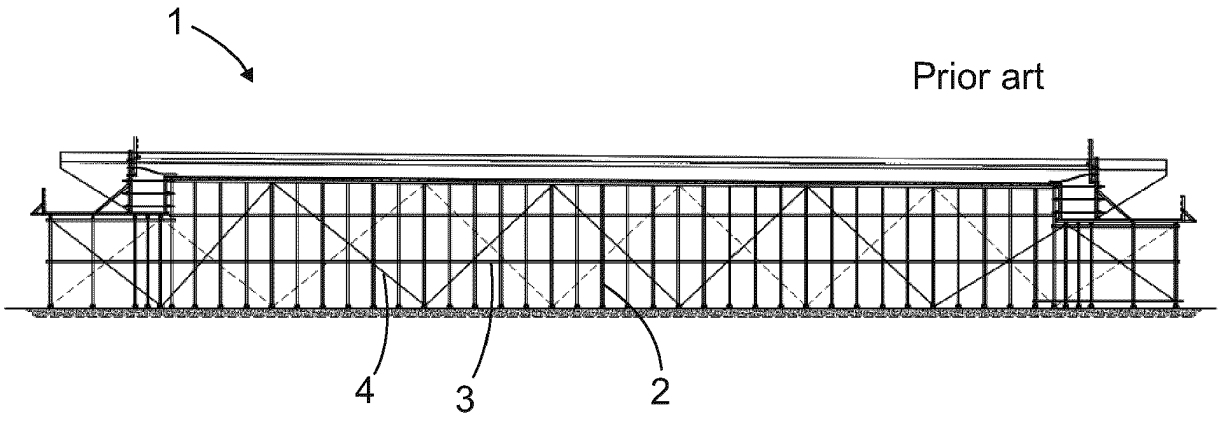

FIG. 1

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Description

Background of the invention

[0001] The invention relates to a scaffold for supporting a casting mould for a cast-in-situ reinforced concrete bridge. This type of a scaffold is also referred to as bridge falsework. The scaffold is assembled for the time of bridge construction and dismantled after the bridge has been cast.

[0002] Further, the invention relates to a method for supporting a casting mould for a cast-in-situ reinforced concrete bridge.

[0003] The object of the invention is described in more detail in the preambles of independent claims of the application.

[0004] A bridge scaffold or falsework is a structure built for a temporary duration to support the structure of a bridge under construction. In other words, the bridge under construction is supported for the time of the construction work. Typically, the scaffold comprises scaffold foundations, a large number of vertical posts, diagonal and horizontal supports to prevent the vertical posts from buckling and tilting, and also top beams supported on the upper ends of the vertical posts, on which top beams the bridge casting mould is then built to be supported. The disadvantage of the currently used falsework is the requirement for a large amount of materials and construction work at the installation site.

Brief description of the invention

[0005] The idea of the invention is to provide a new and improved support scaffold for a bridge and a method for supporting a casting mould.

[0006] The features characterizing the scaffold according to the invention are presented in the characterizing part of the independent device claim.

[0007] The features characterizing the method according to the invention are presented in the characterizing part of the independent method claim.

[0008] The idea of the proposed configuration is that the scaffold is intended to support a casting mould for a cast-in-situ reinforced concrete bridge and it has been manufactured at least mainly from wood material and comprises vertical and horizontal supports. Further, the scaffold comprises several vertical support structures spaced from each other in the longitudinal direction of the bridge. Between these vertical support structures there are side by side several separate truss structures arranged along the longitudinal direction of the bridge. Said truss structures are wooden. Further, each truss structure is supported to the vertical structures only at support points located at the longitudinal ends of the truss structure, such that no separate vertical supports supported to the ground are arranged in the portions between the support points. In other words, the trusses are only supported by their ends.

[0009] The advantage of the proposed configuration is that building of the bridge scaffold may become quicker by using prefabricated truss structures. The truss structures may be manufactured under good factory conditions, whereby their quality will be good and their load bearing capacity guaranteed. Due to the truss construction, the bridge scaffold may comprise less timber than before, which lowers the cost of the scaffold. In addition, the scaffold as proposed is subject to a lower wind load because of the smaller surface area of the support structures.

[0010] The idea of one embodiment is that the upper beam of each of the truss structures is configured to constitute a support surface for the casting mould, such that no separate horizontal support beams are arranged in the scaffold.

[0011] The idea of one embodiment is that the scaffold comprises, as the vertical support structure, at least one casting tower in the portion between the ends of the bridge. The casting tower is a wooden single-use structure comprising several vertical wood planks, horizontal wood planks, and diagonal supports.

[0012] The idea of one embodiment is that said truss structure has a triangular structure comprising a horizontal upper beam and two diagonal downwardly oriented side beams providing the triangular shape. The triangular truss structure bears forces particularly well, thus providing a structure which is strong in relation to its weight and also simple.

[0013] The idea of one embodiment is that the truss structures of the scaffold are single-use. In this case, the truss structures are dismantled in connection with dismantling of the bridge casting mould. By means of the single-use trusses it will be ensured that the trusses are always as planned and in good condition. If the same trusses were used several times for building different bridges, they should be inspected and serviced after each time they are used, which would cause great costs - and still the load bearing capacity of the trusses could not be completely ensured. The use of single-use trusses streamlines construction and ensures good quality and safety.

[0014] The idea of one embodiment is that said wooden truss structures are located at the passageway for the bridge.

[0015] The idea of one embodiment is that said wooden truss structures are located elsewhere than at the passageway for the bridge. The bridge being built does not necessarily have passageways.

[0016] The idea of one embodiment is that said wooden truss structures are located at the passageways for the bridge and elsewhere than at the passageways for the bridge.

[0017] The idea of one embodiment is that as an alternative to the casting tower, the trusses may be supported between wood or steel piles driven into the ground. In this case, the piles may work as the vertical support structure of the scaffold.

[0018] The idea of one embodiment is that the vertical support structure is a scaffold structure which may be assembled and dismantled several times. The scaffold structure may comprise steel or aluminium components from which it is assembled on the work site. The trusses may be supported to these scaffold structures.

[0019] The idea of one embodiment is that at the support point between the truss structure and the vertical structure there is a pressure plate to distribute the vertical load over a larger surface area. The pressure plate may be, for example, a piece of plywood plate. Alternatively, the vertical load between the structures, i.e. the so-called stamp pressure, may be distributed over a larger surface area by means of nail plates.

[0020] The idea of one embodiment is that the casting tower is only part of the support structure of the scaffold, and it contains no mould for casting the reinforced concrete structure. In other words, the casting tower is a temporary vertical support structure which is dismantled after the bridge has been cast and no permanent structure will remain inside. The casting tower is thus different from bridge post moulds in which the reinforced concrete structure is cast.

[0021] The idea of one embodiment is that instead of the triangular shape, the truss structure may have a substantially rectangular shape. In this case, it comprises horizontal upper and lower beams and diagonal supports between them. The rectangular truss is well suited to conditions where a vertically limited structure is needed. Thus, the use of a rectangular truss is advantageous for example at the passageways for the bridge during the construction stage, as the height of the passageway can this way be arranged as high as possible and also large vehicles may drive under the structure. Due to the rectangular truss, the free vertical height may be as high as possible under the truss.

[0022] The idea of one embodiment is that the triangular truss structure may be a roof truss turned upside down.

[0023] The idea of one embodiment is that truss structures of various sizes are manufactured for stock at the factory and are applied to bridge construction site scaffolds case-specifically. Already a few different trusses are sufficient to cover a majority of different types of scaffolds.

[0024] The idea of one embodiment is that the truss structure is made from normal strength graded sawn timber.

[0025] The idea of one embodiment is a method of building a support scaffold for the time of bridge construction using several truss structures supported between vertical structures.

[0026] The idea of one embodiment is that the proposed configuration is suited, in addition to the proposed application to new constructions, also to bridge renovation projects where a support scaffold for the structure is also necessary to be built adjacent to or in connection with an existing bridge.

[0027] The embodiments and their features as presented above may be combined to provide desired configurations.

Brief description of the figures

[0028] Some embodiments of the proposed configuration are presented in more detail in the following figures, in which

Fig. 1 schematically illustrates one prior art bridge scaffold as a side view,
Fig. 2 schematically illustrates one bridge scaffold according to the new configuration as a side view,
Fig. 3 schematically illustrates a detail of one scaffold comprising triangular truss structures between two casting towers,
Fig. 4 illustrates a schematical and cross-sectional detail of one scaffold comprising substantially rectangular truss structures between two pillars or corresponding vertical structures, and
Fig. 5 is a simple diagram disclosing the features of the proposed configuration.

[0029] For clarity purposes, some embodiments of the proposed configurations are illustrated in the figures in a simplified form. The same elements and features are denoted by the same reference numerals in the figures.

Detailed description of some embodiments

[0030] Fig. 1 illustrates a prior art scaffold 1 comprising a large number of vertical posts 2, horizontal posts 3 and diagonal supports 4. The building of this type of a structure is laborious and slow.

[0031] Fig. 2 illustrates the new scaffold 1, wherein truss structures 6 are arranged between vertical support structures 5 to support an upper casting mould 7. The vertical support structures 5 may be casting towers 8 which are temporary structures. Under the vertical support structures 5 there are foundations 9, which may comprise compacted rock material and sills.

[0032] As seen from Fig. 3, the casting towers 8 may comprise vertical wood planks 10, horizontal wood planks 11, and diagonal supports 12. The truss structures 6 supported between the casting towers 8 may comprise an upper beam 13 and diagonal downwardly oriented side beams 14. Between the beams 13 and 14 there are several diagonal and vertical intermediate beams to support the structure. The upper surface of the upper beam 13 functions as a support surface for the casting mould 7, and at the ends of the upper beam 13 there are support surfaces at which the truss structure 6 is supported on support surfaces of the casting towers 8. Between these support surfaces there may be members distributing the surface pressure over a larger surface area.

[0033] Fig. 4 illustrates a rectangular truss structure 6 supported between vertical support posts 15. The sup-

port posts 15 may be piles which may have been driven into ground 16, and they function as the vertical support structure 5. The truss structure 6 may comprise upper beams 13a, 13b and diagonal supports 17 between the beams. Between the upper ends of the support posts 15 and the truss structure 6 there are support points 18 which may be provided with pressure plates.

[0034] The features disclosed in the diagram of Fig. 5 have already been discussed above in this document.

[0035] The figures and their description are only intended to illustrate the idea of the invention. However, the scope of protection of the invention is defined in the claims of the application.

Claims

1. A scaffold (1) for supporting a casting mould (7) for a cast-in-situ reinforced concrete bridge;
the scaffold (1) having been manufactured at least mainly from wood material and comprising vertical and horizontal supports;
characterized in
that the scaffold (1) comprises several vertical support structures (5) spaced from each other in the longitudinal direction of the bridge;
that between the vertical support structures (5) there are side by side several separate truss structures (6) arranged along the longitudinal direction of the bridge;
that the truss structures (6) are wooden; and
that each truss structure (6) is supported to the vertical support structures (5) only at support points (18) located at the longitudinal ends of the truss structure, such that no separate vertical supports supported to ground (16) are arranged in the portions between the support points (18) .

2. The scaffold according to claim 1, **characterized in that** an upper beam (13) of each of the truss structures (6) is configured to constitute a support surface for the casting mould (7), such that no separate horizontal support beams are arranged in the scaffold (1).

3. The scaffold according to claim 1 or 2, **characterized in**
that the scaffold (1) comprises, as the vertical support structure (5), at least one casting tower (8) in the portion between the ends of the bridge;
that the casting tower (8) is a wooden single-use structure comprising several vertical wood planks (10), horizontal wood planks (11), and diagonal supports (12).

4. The scaffold according to any of the preceding claims 1 - 3, **characterized in**
that each truss structure (6) has a triangular structure comprising a horizontal upper beam (13) and two diagonal downwardly oriented side beams (14) providing the triangular shape.

5. The scaffold according to any of the preceding claims 1 - 4, **characterized in**
that the truss structures (6) are single-use, whereby they are intended to be dismantled in connection with dismantling of the casting mould (7).

6. The scaffold according to any of the preceding claims 1 - 5, **characterized in**
that at the support point (18) between the truss structure (6) and the vertical support structure (5) there is a pressure plate configured to distribute the vertical load applied to the scaffold (1) over a larger surface area between the truss structure (6) and the vertical support structure (5).

7. A method for supporting a casting mould (7) for the time of bridge construction,
the method comprising supporting the casting mould (7) to ground (16) by means of a scaffold (1);
characterized in
that the scaffold (1) is provided with several vertical support structures (5) spaced from each other in the longitudinal direction of the bridge;
the scaffold (1) is provided with several wooden truss structures (6);
several separate truss structures (6) are arranged between the vertical support structures (5) side by side;
the longitudinal ends of each of the truss structures (6) are supported to the vertical support structures (5); and
the portions between the vertical support structures (5) in the scaffold (1) are configured without separate vertical supports supported to the ground (16).

8. The method according to claim 7, **characterized in that**
the vertical support structures (5) are also manufactured from wood material, such that the entire scaffold (1) is manufactured at least mainly from wood.

9. The method according to claim 7 or 8, **characterized in that**
single-use wooden truss structures (6) are used, the truss structures being broken down when dismantling the scaffold after the bridge has been cast.

10. The method according to any of the preceding claims 7 - 9, **characterized in that**
the scaffold (1) is provided with a free passageway under the truss structure (6).

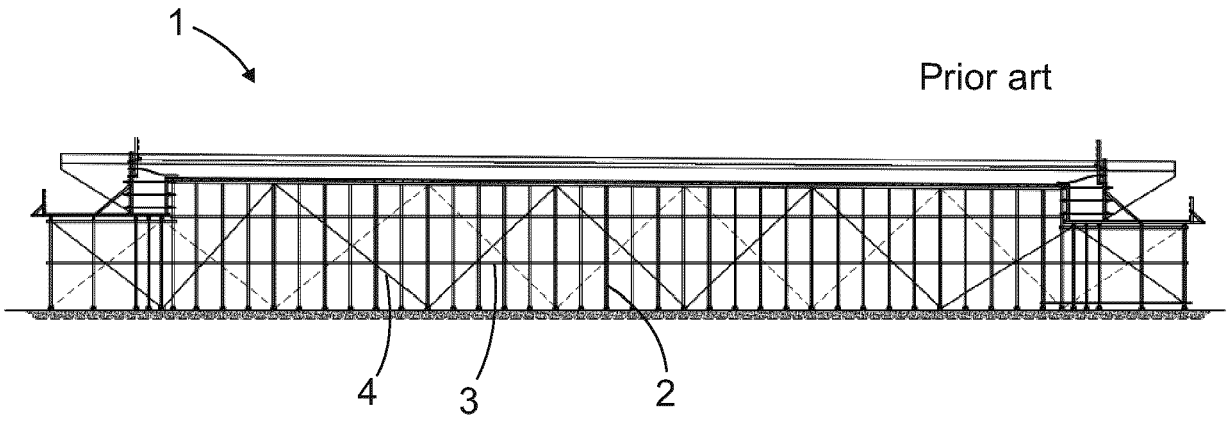

FIG. 1

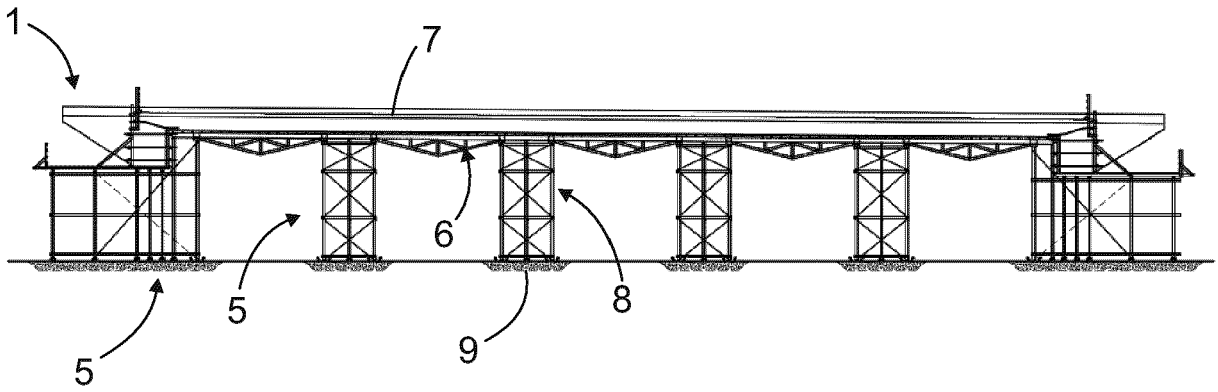

FIG. 2

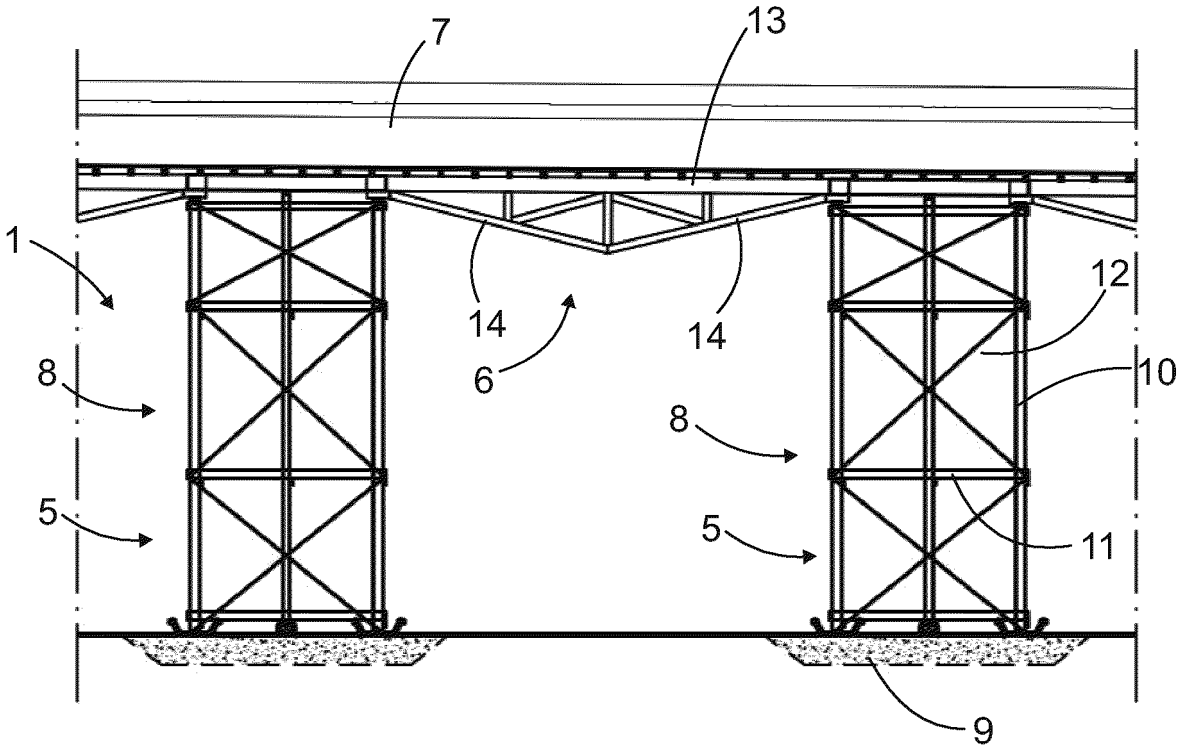

FIG. 3

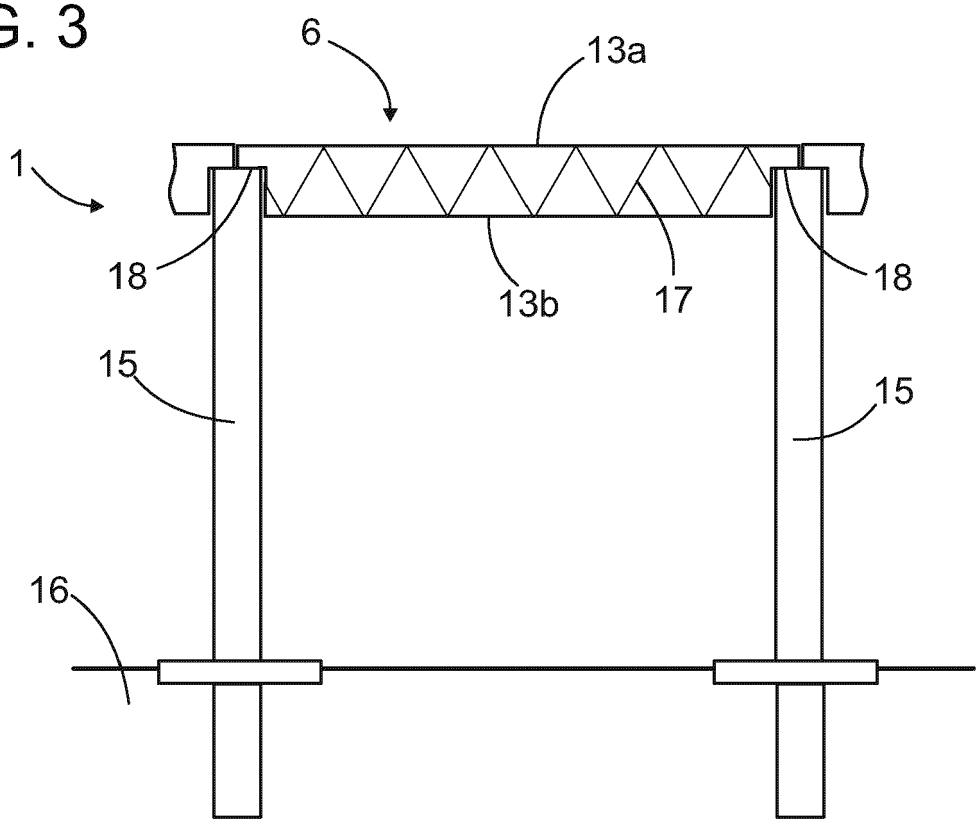

FIG. 4

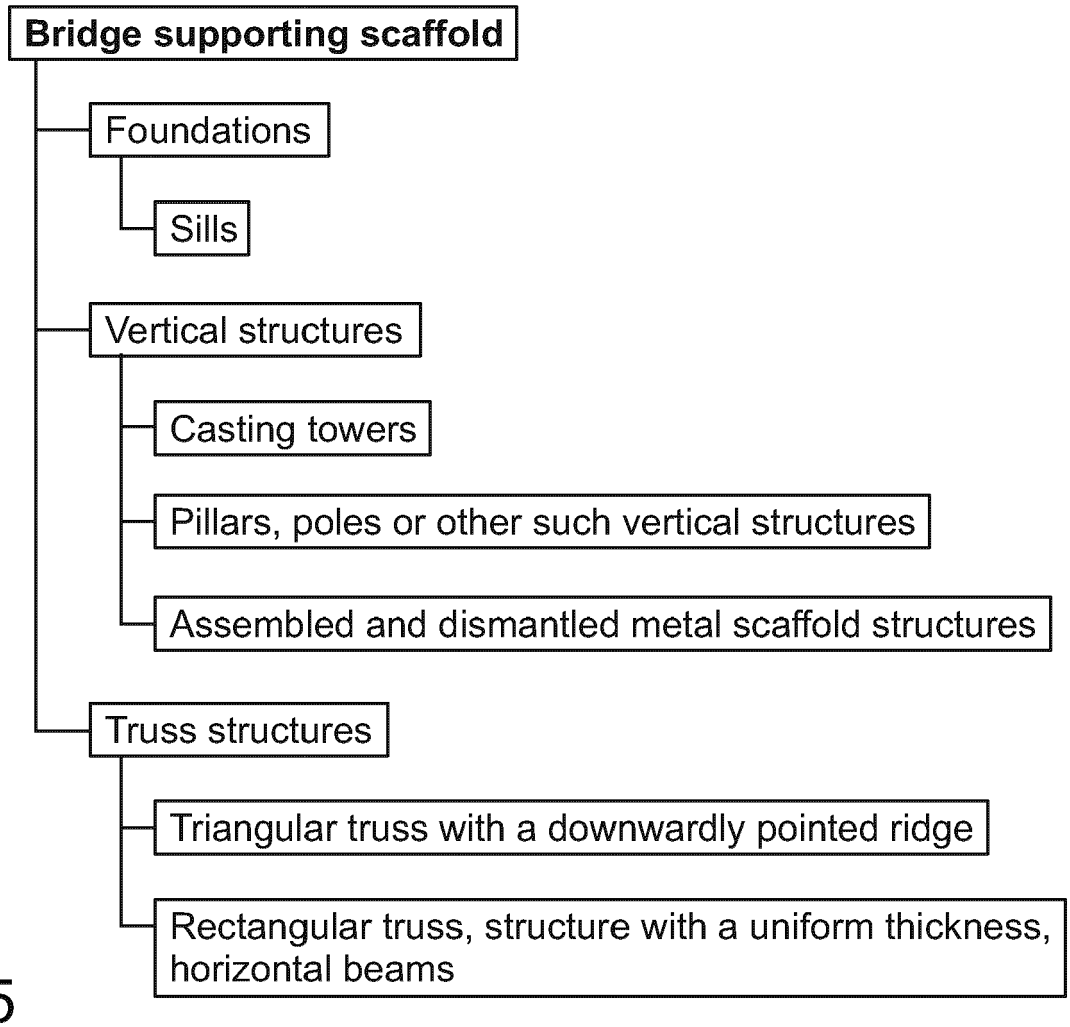
Bridge supporting scaffold
Foundations
Sills
Vertical structures
Casting towers
Pillars, poles or other such vertical structures
Assembled and dismantled metal scaffold structures
Truss structures
Triangular truss with a downwardly pointed ridge
Rectangular truss, structure with a uniform thickness, horizontal beams

FIG. 5

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EUROPEAN SEARCH REPORT

Application Number
EP 20 15 3082

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
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A	DE 93 15 849 U1 (OELKERS HEINZ [DE]; HUESER FRANZ JOSEF [DE]) 16 February 1995 (1995-02-16) * the whole document *	1,7	

TECHNICAL FIELDS SEARCHED (IPC)

E01D
E04G

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
Munich	5 August 2020	Beucher, Stefan

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
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05-08-2020

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