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(54) **SUPPORT SYSTEM FOR FORMWORKS**

(57) The invention relates to a support system for roof formworks object of this invention with elements for providing greater stability to the system while facilitating the assembly and disassembly thereof, consisting of a purlin with an anchoring system to a purlin holder, a purlin holder with an anchoring system to a head, a head with a seat for purlins, a head with an overlapping accessory for purlin holders and a distance fixer for purlins.

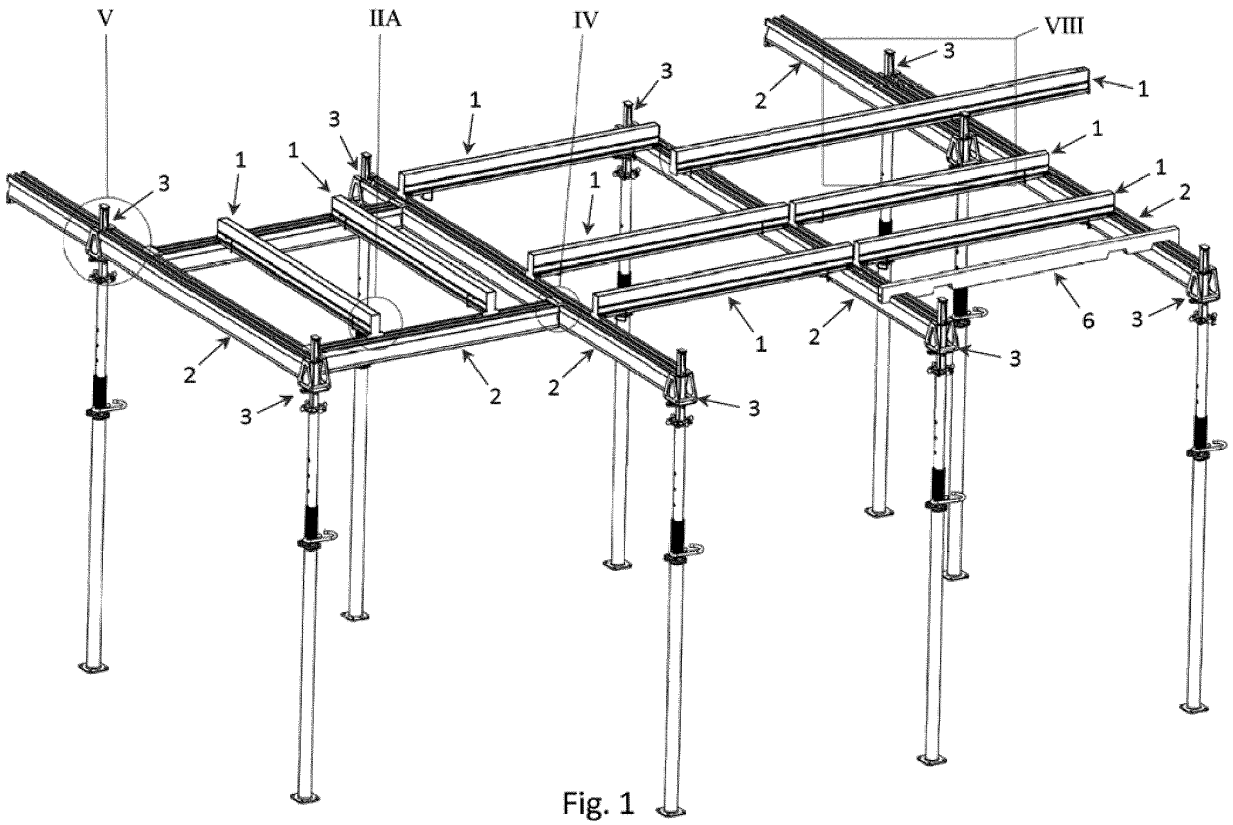


Fig. 1

EP 3 798 387 A1

Description

BACKGROUND OF THE INVENTION

[0001] Different support systems for roof formworks are known in the current state of the art, wherein elements are used with the intention of providing stability to the system while facilitating the assembly and disassembly thereof by the operators.

[0002] As for the joint between purlins and purlin holders, there are systems in which the ends of the purlins have terminals in order to be anchored on top of the purlin holders, such as the ones shown in documents ES2266434T3 or ES2269006A1. In them, however, it is not possible to install the purlin holders at a distance different from the one fixed beforehand by the length of the purlins, since these are configured to rest only on the terminals thereof. In the systems in which this is possible, as shown in document FR2760482A1, what is complicated is removing the purlins from the purlin holders without damaging the supported panels of the formwork at all, since the purlins are not designed to be pivoted with respect to the anchoring point thereof without moving upwards.

[0003] As for the joint between the purlin holders and the heads of the posts, there are systems wherein the ends of the purlin holders have terminals in order to be anchored to the heads by tilting them from a level lower than the heads. However, it is either not possible to place the purlin holders from above the head, as shown in document EP0751268A2, it is very expensive to position purlins with different lengths, such as the one shown in document US2018334818, or they result in terminals that are expensive to add to the purlin holders, like the ones shown in document KR101012088B1. Moreover, safety systems are known so that the purlin holders are not unintentionally released from the heads, such as the ones shown in documents CN105926932A or GB2065654A. However, these systems are complex to use and expensive to manufacture.

[0004] The need for purlin holders to overlap in the heads is also known, as shown in document KR201203729U. However, in this type of system it is difficult to place purlin holders is laborious, whether only one must be placed or two which are overlapping.

[0005] As for the stability of the system, there are elements which fix the distance between the purlin holders, such as the one shown in document US2018340342A1. However, this document does not indicate whether the configuration of the element enables the adjustment of the positioning thereof by itself.

[0006] Therefore, there is still a need for a system that is inexpensive to manufacture and that meets the requirements for robustness when used and is quick to assemble and disassemble.

DESCRIPTION OF THE INVENTION

[0007] The support system for roof formworks object of this invention comprises several elements which bring novelty to the application field thereof, all of these designed to contribute greater stability for the system while facilitating the assembly and disassembly thereof.

[0008] One of the elements of the system corresponds to a purlin, consisting of a beam defined by a profile comprising a flat lower surface so that it can rest on the upper surface of one or more purlin holders. The present purlin is characterised in that at least one end of the profile comprises a terminal, the base of which is defined by an inner corner adjacent to the profile and an outer corner longitudinally opposite from the previous one, the outer corner having a descending extension configured as a bearing point in a longitudinal slot of a purlin holder.

[0009] In turn, the system comprises a slotted purlin holder defined by a profile comprising a flat upper surface, characterised in that it comprises at least one slot in the longitudinal direction on the upper surface, suitable for receiving the descending extension of the terminal of the previous purlin.

[0010] This purlin and slotted purlin holder configuration offers an alternative support system for roof formworks, which is inexpensive to manufacture, enabling the operators to place the purlin in the slotted purlin holder from a level lower than the formwork, and which prevents the unintended detachment of the purlins once installed.

[0011] In a preferred embodiment of the purlin, it is the external edge of the descending extension which is defined in order to be the bearing point in the slot (i.e. it does not form a right angle, but rather an angle less than 90°), such that the purlin can be removed by pivoting it downwards with respect to said external edge. Thanks to this configuration, the upper end of the purlin does not rise when it is pivoted downwards, which prevents the movement of the supported formwork. At the same time, in this preferred embodiment, the extension has sufficient length so as to have the space necessary to remove the purlin from the slotted purlin holder by pivoting it downwards without needing to raise the supported formwork. This length, therefore, is linked to the depth and to the width of the slot, as well as to the distance from the slot to the side surface of the purlin holder.

[0012] In an even more preferred embodiment of the purlin, the length of the extension is such that, in the resting condition thereof in said slot, the lower surface of the profile is at the same level as the upper surface of the purlin holder, while the terminal has a groove in the lower face thereof, transverse to the longitudinal direction of the profile and located between the inner corner and the outer corner, the depth and width dimensions of which enable there to be the necessary space in order to remove the purlin from the slotted purlin holder without needing to raise the supported formwork. Thanks to this configuration, the space for removing the purlin from the slotted purlin holder is still provided without raising the

supported formwork, while enabling the purlin to be at the same height in the case that the lower surface of the profile needs to rest on the upper surface of the slotted purlin holder, and not the terminal, leaving a section of the purlin cantilevered.

[0013] In a possible improvement of the previous embodiments of the purlin, the upper corner of the outer face of the terminal is rounded, such that the removal of the purlin without raising the supported formwork is further facilitated.

[0014] As an option, the base of the terminal, or at least the supporting extension, has a width larger than the base of the profile, with the intention of offering greater stability when resting on the slotted purlin holder.

[0015] As for the slotted purlin holder, a preferred embodiment may comprise two longitudinal slots in the entirety of the upper surface, suitable to enable receiving two purlins aligned with each other, one on each side of the slotted purlin holder.

[0016] In order to position purlins in a transverse position with each other, the system may comprise slotted purlin holders comprising at least one terminal with an upper extension projected in the shape of a hook, configured to rest when in use in the slot of the slotted purlin holder described initially, the latter being adjacent to said terminal and in a transverse position, the upper surfaces of both purlin holders having the same height.

[0017] Another element that the system may comprise, in combination with the purlins and slotted purlin holders described above, consists of a head for posts, of the type comprising support elements for the purlin holders, characterised in that it comprises at least one supporting seat for the terminals of the purlins, consisting of a slotted surface or with a height difference or a stop flange, positioned at a height with respect to the support elements for purlin holders such that when in use the seat provides continuity, as a bearing point of said terminals, for the slots of the previous purlin holders. In this manner, the system enables the purlins to be positioned even in the heads, wherein the purlin holders are interrupted.

[0018] Another element of the present system consists of a distance fixer for the distance between purlin holders which is self-adjusting, defined by a profile comprising at least two lower slots intended to receive two parallel purlin holders, the distance of which is to be fixed, the slots being transverse to the longitudinal direction of the profile, being characterised in that the width of the slots in the entrance area thereof is larger than that of the purlin holders, while it is decreasing as the slot goes further into the profile to a width smaller than that of the purlin holders. Thanks to the self-adjusting configuration of the slots, the present fixer enables the distance between the purlin holders to be fixed (and therefore helps to stabilise the formwork support system) without needing to place it precisely and without needing the purlin holders to be at a precise distance. Preferably, the height of the fixer is sufficiently reduced so that, when in use, it does not come in contact with the panels of the formwork, such that it is only the purlins that support them.

[0019] A transcendental element of the present system consists of a head for posts of the type comprising a horizontal support surface for purlin holders, which extends from two of the opposite sides of the head, the head being characterised in that it comprises two cylindrical crossbeams, parallel to each other, in a horizontal position, symmetrical with respect to a middle plane of the head and fastened to the horizontal support surface above the ends thereof. Linked to this head, the system comprises a purlin holder resting on the head, characterised in that it has at least one terminal, the base of which is defined by an inner corner adjacent to the profile and an outer corner longitudinally opposite from the previous one, each corner having a descending extension, which are at a suitable distance in order to fit one of the crossbeams of the head therebetween and with a very reduced clearance, the external descending extension of one crossbeam being such that it is the only bearing point of the purlin holder in said head.

[0020] Thanks to this configuration of a head and a purlin holder, it enables the installation to have a very reduced clearance of the latter in the head, either by tilting it from a level lower than the head or placing it horizontally from above.

[0021] In a preferred embodiment, the head can comprise a column collinear to the post and a mechanism for decoupling and lowering it along the column, such as those already known in the state of the art, in order to enable the descent of the horizontal support surface, as well as the crossbeams joined thereto. This facilitates the disassembly of the purlins and the purlin holders without needing to remove the posts.

[0022] In turn, this head can also combine the horizontal support surface for purlin holders with at least one supporting seat for purlins comprised in the head described above. In this case, the horizontal support surface for purlin holders can be joined to the seat, such that the lowering mechanism can also lower the purlins supported thereon. In a possible embodiment, the seat can be joined to the horizontal surface by means of plates located at corresponding lateral ends. In another possible embodiment, the seat and the horizontal surface can be joined by means of a profile or by means of several plates which join corresponding internal perimeters surrounding the column.

[0023] With respect to the purlin holder resting on the head, the end of the external extension is preferably chamfered or rounded, or ends in an angle less than 90° such that the contact area on the horizontal surface of the head is reduced.

[0024] Another possible component of the system consists of a head for posts, of the type comprising support elements for purlin holders, a column collinear to the post, the height of which exceeds that of the purlin holders and a mechanism for lowering said support elements along said column. This head is characterised in that it comprises at least one set of automatic holding means for a

purlin holder, formed by a rod, either rigid or semi-rigid, with a substantially vertical upper section, the upper end of which is joined to the column at a height greater than that of the purlin holders, optionally in a manner that is tilting in comparison to the vertical plane coinciding with that of the purlin holder, and with a substantially horizontal lower section, positioned slightly above the purlin holder and linked to a deformable pushing element which enables it to move towards the column when a purlin holder presses it so as to be placed in the support element thereof and at the same time forces it to move away from the column once the purlin holder has been placed so as to be located above it.

[0025] In a possible embodiment of this head, the pushing element can consist of a spring-type element fastened to the column. In another possible embodiment, the pushing element may consist of a second rod placed on the other side of the column in a symmetrical manner, the corresponding lower sections being joined, either crossing through the column or on the side thereof, such that the very weight or the very elastic nature of the rods is what exerts the force in order to recover the resting positions thereof once the purlin holder has been placed.

[0026] Regardless, this last head can include any of the features of the heads described above.

[0027] Another possible head of the system consists of one that, comprising at least one support element for a purlin holder, is characterised in that it comprises an overlapping accessory of a second purlin holder, consisting of at least one platen joined to the side of said support element, comprising a support surface configured to support the second purlin holder in a parallel position and at the same height that the first purlin holder would be at in the support element thereof. In this manner, the adjustment in length of the alignments of purlin holders is enabled without needing to have purlin holders with different lengths.

[0028] In a preferred embodiment, this overlapping accessory comprises a lateral retainer for the purlin holder, consisting of an ascending flange located at the end of the platen. Likewise, the overlapping accessory can also comprise at least one ascending projection configured to be introduced into at least one complementary hole located on the lower face of the second purlin holder.

[0029] Both this latter head and the purlin holder able to be overlapped with the hole complementary to the projection can respectively comprise the features of the heads and the purlin holders described above.

[0030] These and other features and advantages of the system object of the present invention will be evident in light of the description of a preferred, but not exclusive, embodiment which is illustrated by way of non-limiting example in the drawings which are attached.

BRIEF DESCRIPTION OF THE DRAWINGS

[0031]

Figure 1 is a top perspective view of the present support system for roof formworks.

Figure 2A is a view of detail IIA of Figure 1.

Figure 2B is an elevation view of a first example of positioning of a preferred embodiment of a purlin in a preferred embodiment of a purlin holder.

Figure 3 is an elevation view of a second example of positioning of a preferred embodiment of a purlin in a preferred embodiment of a purlin holder.

Figure 4 is an elevation view of a possible disassembly step of the present support system for roof formworks.

Figure 5 is a view of detail IV of Figure 1.

Figure 6 is a view of detail V of Figure 1.

Figure 7A is a front top perspective view of a preferred embodiment of the head for posts.

Figure 7B is a rear bottom perspective view of a preferred embodiment of the head for posts.

Figure 8A is a top perspective view of a preferred embodiment of the slotted purlin holder.

Figure 8B is a view of a cut through the middle vertical plane of the head with two anchored purlin holders.

Figure 9 is a bottom perspective view of detail VIII of Figure 1.

Figure 10 is a top perspective view of the distance fixer.

DESCRIPTION OF A PREFERRED EMBODIMENT

[0032] As shown in Figure 1, the present invention consists of a support system for roof formworks comprising several elements designed to provide greater stability to the system while facilitating the assembly and disassembly thereof.

[0033] As seen in the detail shown in Figure 2A, as well as in Figure 2B and Figure 3, one element of the system corresponds to purlins (1), consisting of a beam defined by a profile (11) comprising a lower flat surface so that it can rest on the upper surface of one or more slotted purlin holders (2). In this preferred embodiment, one end of the profile (11) comprises a terminal (12), the base of which is defined by an inner corner (13) adjacent to the profile (11) and an outer corner (14) longitudinally opposite from the previous one, the outer corner (14) having a descending extension (15). In turn, as seen in the aforementioned figures, this embodiment of the system comprises slotted purlin holders (2) defined by a profile (21) comprising a flat upper surface with two longitudinal slots (20), suitable for receiving the extension (15) of the terminal (12) of the purlin. In this preferred embodiment, the external face of the extension (15) does not end in a right angle, but rather in an angle somewhat less than 90°, such that it is the external edge (16) thereof which is defined to be the bearing point in the slots (20). At the same time, the length of the extension (15) is such that, in the resting condition thereof in said slots (20), the lower surface of the profile (11) is at the same level as the upper surface of the slotted purlin holders (2), while

the terminal (12) has a groove (17) in the lower face thereof, transverse to the longitudinal direction of the profile (11) and located between the inner corner (13) and the outer corner (14), the depth and width dimensions of which enable there to be the necessary space in order to remove the purlins (1) from the slotted purlin holders (2) without needing to raise the supported formwork (not shown in the figures). Likewise, the upper corner (18) of the outer face of the terminal (12) is rounded.

[0034] Figure 4 shows an elevation view of a possible disassembly step of the present support system for roof formworks, wherein the supported formwork (E) is seen, as well as three rails of purlin holders and posts with the corresponding heads (3) and the lowering mechanisms (4) thereof. In this step, the two heads on the right are in the disassembly position, with the corresponding mechanisms (4) unloaded, while the head (3) on the right is still with the loaded mechanism (4), meaning, anchored in the use position. Due to this, the situation occurs in which a purlin (1), in this case the middle one, is unloaded on one end and loaded on the other. A situation like this occurs every time a system similar to the one of the present invention is disassembled, since the operators unload the heads (3) of a rail of posts after having unloaded all the heads (3) from the previous rail. In these types of systems, when one of the ends of the purlins is released and the other end stays loaded in another head, since they are not configured to pivot without moving upwards, or the purlin stays horizontal, with the danger of collapsing when unloading the head supporting it, or it damages the panel it supports. However, thanks to the anchoring system between the purlins (1) and purlin holders (2) of the present invention, the purlin (1) can tilt without moving upwards, for which reason the aforementioned drawbacks are avoided.

[0035] As seen in the detail shown in Figure 5, this preferred embodiment of the system also comprises an example of a slotted purlin holder (2), the terminal (22') of which has an upper extension (25") projected in the shape of a hook, configured to rest in the slots (20) of the slotted purlin holders (2) described initially, staying therebetween in a transverse position and with the upper surfaces having the same height.

[0036] Another element present in the system consists of a head for posts (3) whereon one or two slotted purlin holders (2) rest, which, in this preferred embodiment, comprises two seats (31) for the terminals (12) of the purlins (1), one on each side of the head. As seen in the detail of Figure 6 and in Figures 7A and 7B, the seats (31) of this exemplary embodiment consist of a surface with a height difference, which is positioned at a height such that it provides continuity, as a bearing point of said terminals (12), for the slots (20) of the previous purlin holders (2).

[0037] This embodiment of head (3) in turn comprises a horizontal support surface (32) for the purlin holders (2), which extends from two of the opposite sides of the head (3), as well as two cylindrical crossbeams (33), parallel to each other, in a horizontal position, symmetrical with respect to a middle plane of the head (3) and fastened to the horizontal surface (32) above the ends thereof. In this embodiment, the seats (31) and the crossbeams (33) are joined to the horizontal surface (32) by corresponding lateral ends.

[0038] Likewise, this embodiment of head (3) comprises a column (34) collinear to the post supporting it and a mechanism (4) for decoupling and lowering the horizontal surface (32), as well as the seats (31) and the crossbeams (33), since they are joined to each other.

[0039] This embodiment of head (3) is linked to slotted purlin holders (2) resting on the head (3), as seen in Figures 8A and 8B. These embodiments of slotted purlin holders (2) comprise terminals (22), the base of which is defined by an inner corner (23) adjacent to the profile (21) of said slotted purlin holders (2) and an outer corner (24) longitudinally opposite from the previous one, each corner (23, 24) having a descending extension (25, 25'), spaced in order to fit one of the crossbeams (33) of the head (3) therebetween with a reduced clearance, the external descending extension (25) of one crossbeam being such that it is the only bearing point of the slotted purlin holder (2) in said head (3). In this case, the end of the external descending extension (25) does not end in a right angle, but in a somewhat smaller angle (α), such that the external edge (26) thereof is defined to be the bearing point on the horizontal surface (32), such that the contact area is reduced.

[0040] This head (3), as seen in Figures 7A, 7B and 8B, in turn comprises two automatic holding means (5) for two corresponding purlin holders. This embodiment of the automatic holding means (5) is formed by two semi-rigid rods (51), with a substantially vertical upper section, both upper ends being fastened to that of the column (34), with corresponding substantially horizontal lower sections, joined through the column (34) and intended to be positioned slightly above the purlin holders (2). In this case, the rods (51) are semi-rigid, such that they can become curved in the upper section thereof when pushed by a purlin holder and recover the resting position thereof once it is placed. However, thanks to the geometry thereof, they resist the deformation thereof in a vertical direction, thus preventing the purlin holders from being unintentionally released.

[0041] This embodiment of head (3) in turn comprises an overlapping accessory (35) for purlin holders, being slotted purlin holders (2) in this embodiment. This overlapping accessory (35) consists of a platen (36) joined to the side of the horizontal surface (32), comprising a support surface (37) configured to support an overlappable purlin holder (2') in a parallel position and at the same height as another purlin holder (2) supported by the horizontal surface (32). This embodiment of overlapping accessory (35) also comprises an ascending projection (38) configured to be introduced into one of the complementary holes (27) located on the lower face of the overlappable purlin holder (2'), which can be seen in

Figure 9.

[0042] Finally, as shown in Figures 1 and 10, another element of the present system consists of a distance fixer (6) between purlin holders which is self-adjusting, defined by a profile (60) comprising at least two lower slots (61) intended to receive two parallel purlin holders (2) and the distance of which is to be fixed, the slots (61) being transverse to the longitudinal direction of the profile (60). The width of the slots (61) in the entrance area thereof is larger than that of the purlin holders (2), while it is decreasing as the slots (61) enter further into the profile (60) until reaching a width smaller than that of the purlin holders (2).

[0043] Next, possible claims of the elements and of the system described above, which complement those indicated in the claims section, are added as an option for possible divisional applications.

16. A distance fixer (6) between purlin holders which is self-adjusting for support systems for roof formworks, defined by a profile (60) comprising at least two lower slots (61) intended to receive two parallel purlin holders and the distance of which is to be fixed, the lower slots (61) being transverse to the longitudinal direction of the profile (60), characterised in that the width of the lower slots (61) in the entrance area thereof is larger than that of the purlin holders and decreases as the slots (61) enter further into the profile (60) until reaching a width smaller than that of the purlin holders.

17. A head (3) for posts of support systems for roof formworks, of the type comprising support elements for purlin holders, a column (34) collinear to the post, the height of which exceeds that of the purlin holders and a mechanism (4) for lowering said support elements along said column (34), characterised in that it comprises at least one set of automatic holding means (5) for a purlin holder, formed by a rod (51) with a substantially vertical upper section, the upper end of which is joined to the column (34) at a height greater than that of the purlin holders, and with a substantially horizontal lower section, positioned slightly above the purlin holder and linked to a pushing element which enables it to move towards the column (34) when a purlin holder presses it so as to be placed in the support element thereof and at the same time forces it to move away from the column (34) once the purlin holder has been placed so as to be located above it.

18. The head (3) according to claim 17, characterised in that the pushing element consists of a spring-type element fastened to the column.

19. The head (3) according to claim 17, characterised in that the pushing element consists of a second rod placed on the other side of the column in a symmetrical manner, the corresponding lower sections being joined, either crossing through the column or on the side thereof, such that the very weight or the semi-rigid nature of the rods is what exerts the force in order to recover the resting positions thereof once the purlin holder has been placed.

20. The head (3) according to any of claims 17 to 19, characterised in that it comprises the features of the head (3) as described in any of claims 9 to 12.

21. The head (3) for posts of support systems for roof formworks, of the type comprising at least one support element for a purlin holder, characterised in that it comprises an overlapping accessory (35) of an overlappable purlin holder (2') consisting of at least one platen (36) joined to the side of the support element for the first purlin holder, comprising a support surface (37) configured to hold the overlappable purlin holder (2') in a parallel position and at the same height as the first purlin holder.

22. The head (3) according to claim 21, characterised in that the overlapping accessory (35) comprises a lateral retainer for the purlin holder (2) consisting of an ascending flange located at the end of the platen (36).

23. The head (3) according to any of claims 21 or 20, characterised in that the overlapping accessory (35) comprises at least one ascending projection (38) configured to be introduced into at least one complementary hole (27) located on the lower face of the second purlin holder.

24. The head (3) according to any of claims 21 to 23, characterised in that it comprises the features of the head (3) as described in any of claims 17 to 20.

25. An overlappable purlin holder (2') for support systems for roof formworks, characterised in that it comprises on the lower face at least one hole (27) complementary to an ascending projection (38) located in the overlapping accessory (35) of a head (3) as described in any of claims 23 or 24.

26. The overlappable purlin holder (2') according to claim 25, characterised in that it comprises the features of the slotted purlin holder (2) as described in any of claims 13 to 15.

27. A support system for roof formworks characterised in that it comprises at least one purlin as described in any of claims 1 to 4 and at least one slotted purlin holder as described in any of claims 5 to 7, wherein a terminal of the purlin is resting in a slot of the slotted purlin holder.

28. The system according to claim 27, characterised in that it comprises at least one head as described in claim 8, wherein one end of a slotted purlin holder as described in any of claims 5 or 6 is resting in one of the support elements for purlin holders, such that the seat provides continuity as a bearing point of the terminals of the purlins for the surface of one of the slots of the slotted purlin holder.

29. The system according to any of claims 27 or 28, characterised in that it comprises at least one fixer as described in claim 16, wherein two of the lower slots of the fixer are fitted in two purlin holders.

30. The system according to any of claims 27 to 28, characterised in that it comprises at least one head as described in any of claims 9 to 12 and at least one purlin holder as described in any of claims 13 to 15, wherein one of the crossbeams of this head is fitted between the extensions of a terminal of this purlin holder.

31. The system according to any of claims 27 to 30, characterised in that it comprises a head as described in any of claims 17 to 20, wherein at least one purlin holder is supported by this head and held by one of the rods.

32. The system according to any of claims 27 to 32, characterised in that it comprises a head (3) as described in any of claims 21 to 24 and at least one overlapping purlin holder (2') as described in any of claims 25 or 26, wherein this purlin holder is supported by the support surface of the overlapping accessory.

[0044] The details, shapes, dimensions and other accessory elements of the present invention may be conveniently replaced by others that are technically equivalent without departing from the scope defined by the claims included below.

Claims

1. A purlin (1) for support systems for roof formworks, defined by a profile (11) comprising a flat lower surface supportable on the upper surface of one or more purlin holders (2) longitudinally slotted on said upper surface, **characterised in that** at least one end of the profile (11) comprises a terminal (12) having a descending extension (15) configured as a bearing point in the slot (20) of said slotted purlin holders (2).

2. The purlin (1) according to claim 1, **characterised in that** the external edge (16) of the extension (15) forms an angle less than 90°, being defined as the bearing point in the slot (20), while the extension (15) has a sufficient length to be able to remove the purlin (1) from the slotted purlin holder (2) by pivoting it downwards with respect to said external edge (16) without the purlin (1) raising the supported formwork.

3. The purlin (1) according to claim 2, **characterised in that** the length of the extension (15) is such that, in the resting condition in said slot (20), the lower surface of the profile (11) is at the same level as the upper surface of the purlin holder (2), while the terminal (12) has a base defined by an inner corner (13) adjacent to the profile (11) and an outer corner (14) longitudinally opposite from the previous one, the descending extension (15) being in the outer corner (14), the base comprising at the same time a groove (17) in the lower face thereof, transverse to the longitudinal direction of the profile (11) and located between the inner corner (13) and the outer corner (14), the depth and width dimensions of which enable there to be the necessary space in order to remove the purlin (1) from the purlin holder (2) by pivoting it downwards with respect to said outer edge (16) without the purlin (1) raising the supported formwork.

4. The purlin (1) according to any of the preceding claims, **characterised in that** the upper corner (18) of the outer face of the terminal (12) is rounded.

5. A slotted purlin holder (2) for support systems for roof formworks, defined by a profile (21) comprising a flat upper surface, **characterised in that** it comprises at least one slot (20) in the longitudinal direction in the upper surface, suitable for receiving the descending extension (15) of a purlin (1) as described in any of the preceding claims.

6. The slotted purlin holder (2) according to claim 5, **characterised in that** it comprises two longitudinal slots (20) in the entirety of the upper surface, symmetrical to each other with respect to a longitudinal vertical middle plane, suitable to enable the reception of two purlins (1) aligned with each other, one on each side of the slotted purlin holder (2).

7. The slotted purlin holder (2) according to any of claims 5 or 6, **characterised in that** it comprises at least one terminal (22') with an upper extension (25") projected in the shape of a hook, configured in its condition of use to rest in the slot (20) of a slotted purlin holder (2) as described in any of claims 5 or 6, both slotted purlin holders (2) being in a transverse position therebetween and with the upper surfaces having the same height.

8. A head (3) for posts of support systems for roof formworks, of the type comprising support elements for purlin holders, **characterised in that** it comprises at least one supporting seat (31) for the terminals (12) of the purlins (1) as described in claims 1 to 4, consisting of a slotted surface (30) or with a stop flange, and positioned at a height with respect to the support elements for purlin holders, such that in its condition of use the seat (31) provides continuity, as a bearing point of said terminals (12), for the slots (20) of the slotted purlin holder (2) as described in any of claims 5 or 6.

9. A head (3) for posts of support systems for roof formworks, comprising a horizontal support surface (32) for purlin holders which extends from the two opposite sides of the head (3), **characterised in that** it comprises two cylindrical crossbeams (33), parallel to each other, in a horizontal position, symmetrical with respect to a vertical middle plane of the head

(3) and fastened to said horizontal surface (32) above the ends thereof.

10. The head (3) according to claim 9, **characterised in that** it comprises a column (34) collinear to the post and a mechanism (4) for lowering the crossbeams (33) and the horizontal surface (32) through said column (34).

11. The head (3) according to any of claims 9 or 10, **characterised in that** it comprises the features of the head (3) described in claim 8.

12. The head (3) according to claim 11, **characterised in that** the horizontal support surface (32) for purlin holders is joined to the supporting seat (31) for purlins.

13. A purlin holder supportable on a head for support systems for roof formworks, **characterised in that** it comprises at least one terminal (22), the base of which is defined by an inner corner (23) adjacent to the profile (21) and an outer corner (24) longitudinally opposite from the previous one, each corner (23, 24) having a descending extension (25, 25'), which are at a suitable distance in order to fit one of the crossbeams (33) of the head (3) described in any of claims 10 to 13 therebetween with a very reduced clearance, the external descending extension (25) of one crossbeam being such that it is the only bearing point of the purlin holder (2) in said head (3).

14. The purlin holder supportable on a head according to claim 13, **characterised in that** the end of the external descending extension (25) is chamfered or rounded, or ends in an angle (α) less than 90°.

15. The purlin holder supportable on a head according to any of claims 13 or 14, **characterised in that** it comprises the features of the slotted purlin holder (2) of any of claims 5 or 6.

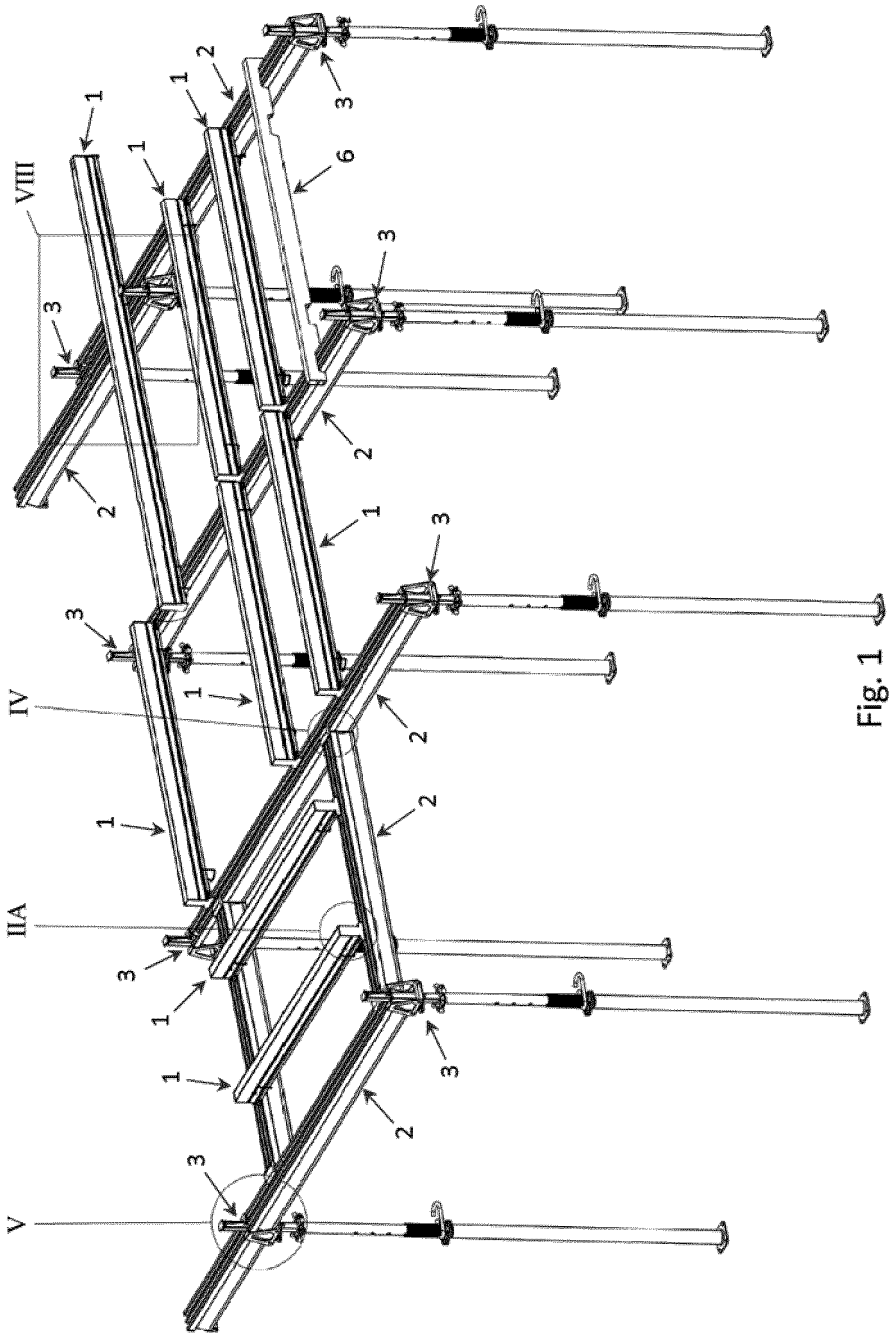


Fig. 1

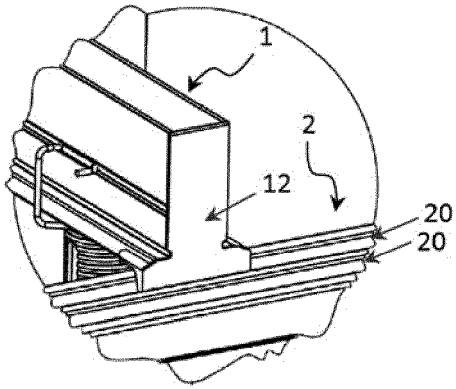


Fig. 2A

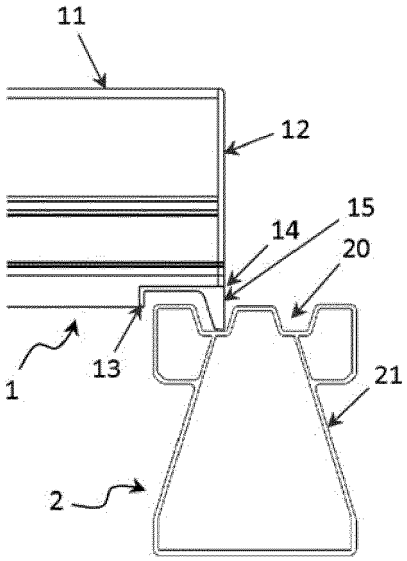


Fig. 2B

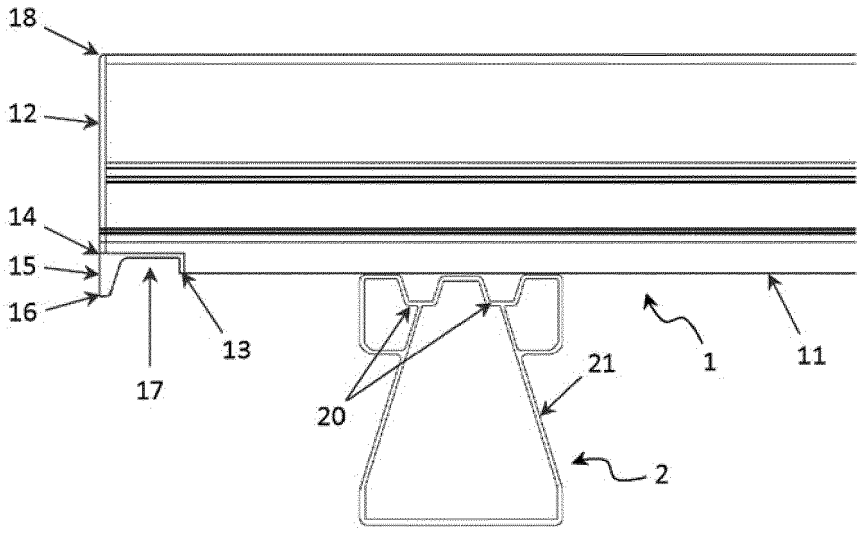


Fig. 3

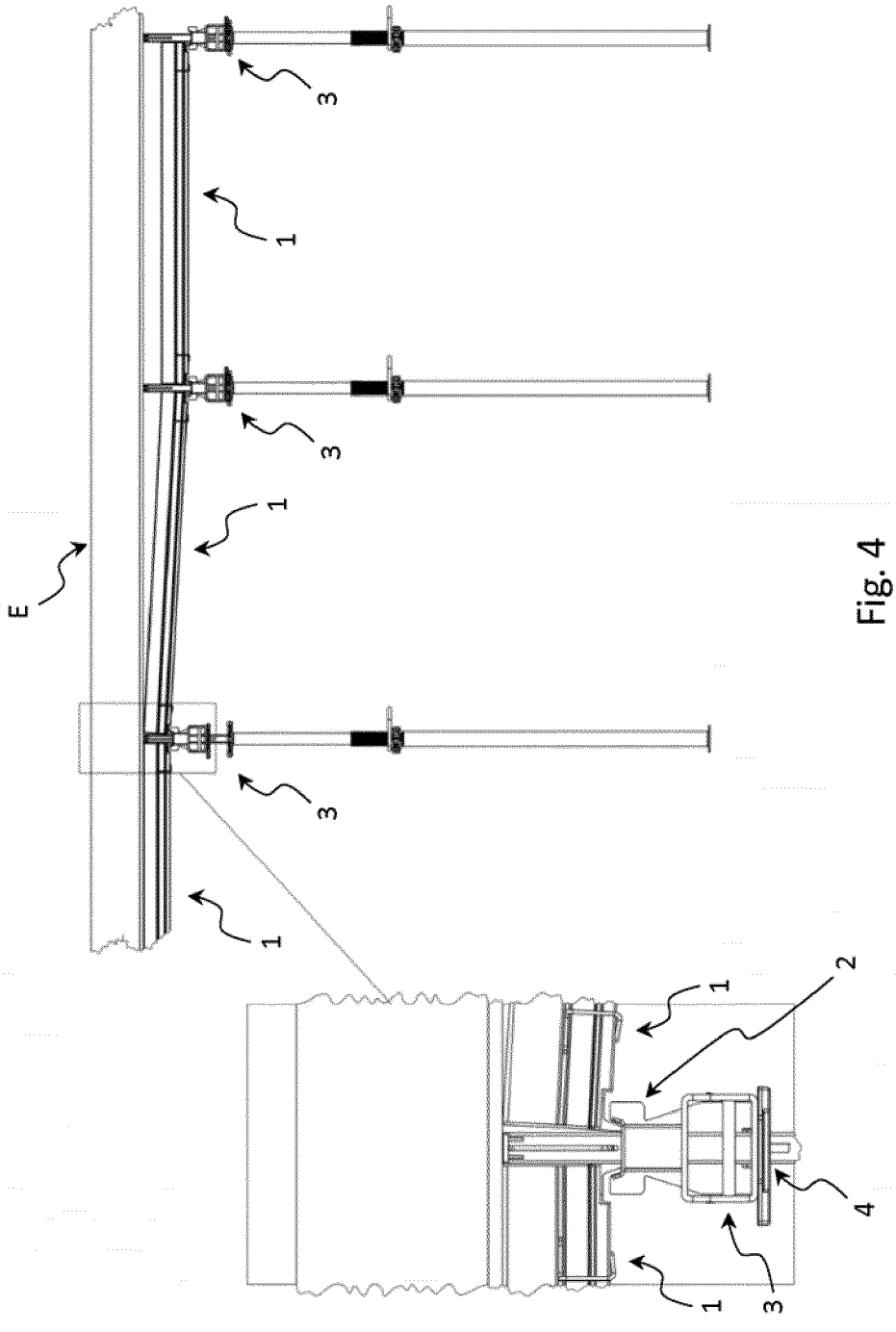


Fig. 4

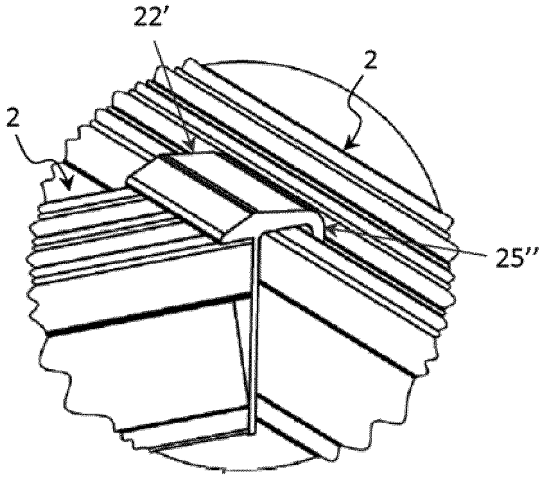


Fig. 5

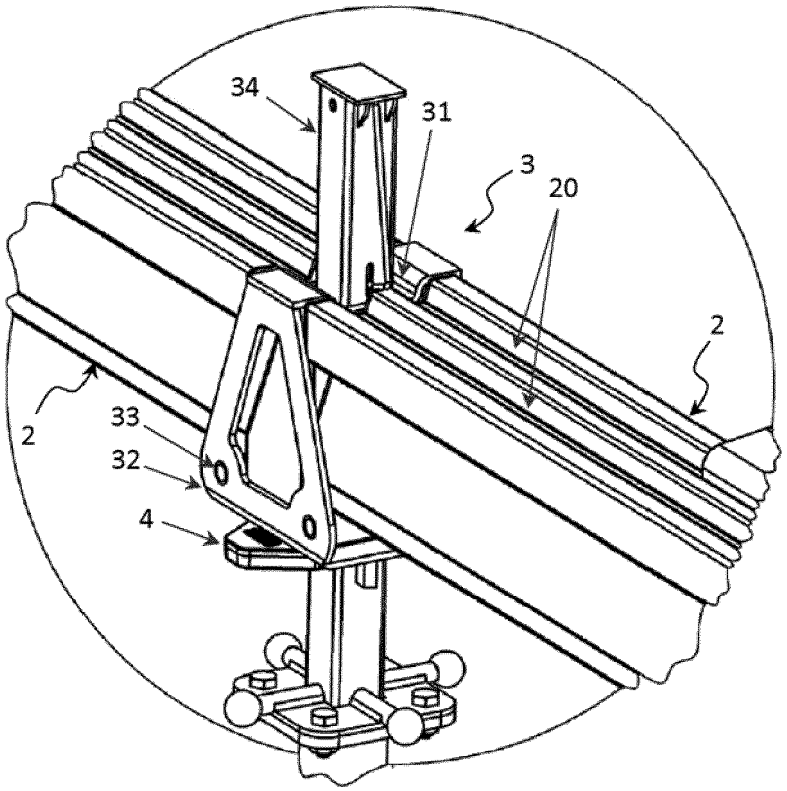


Fig. 6

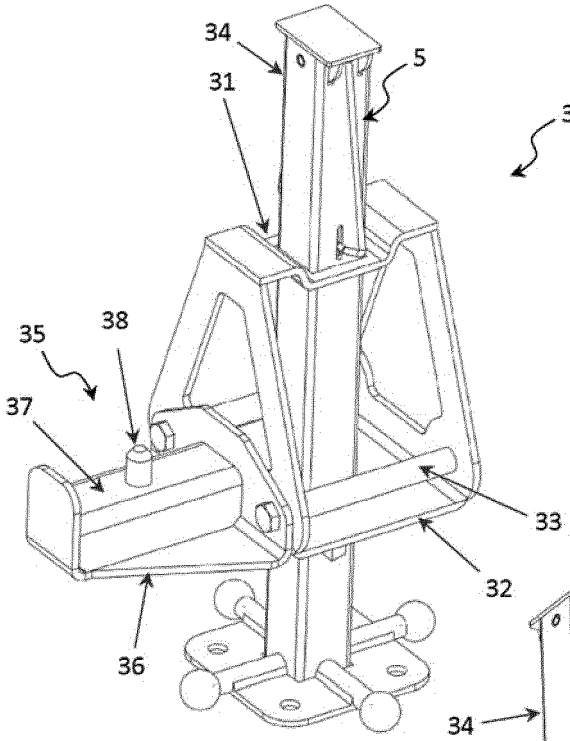


Fig. 7A

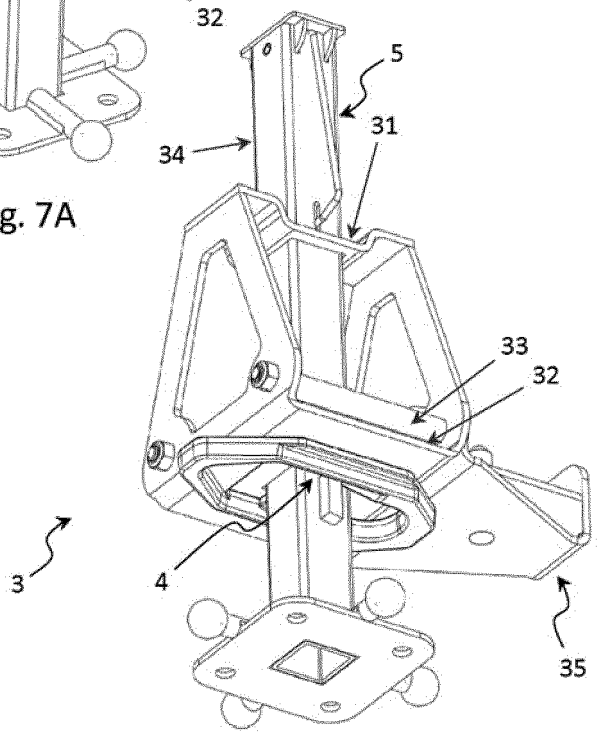
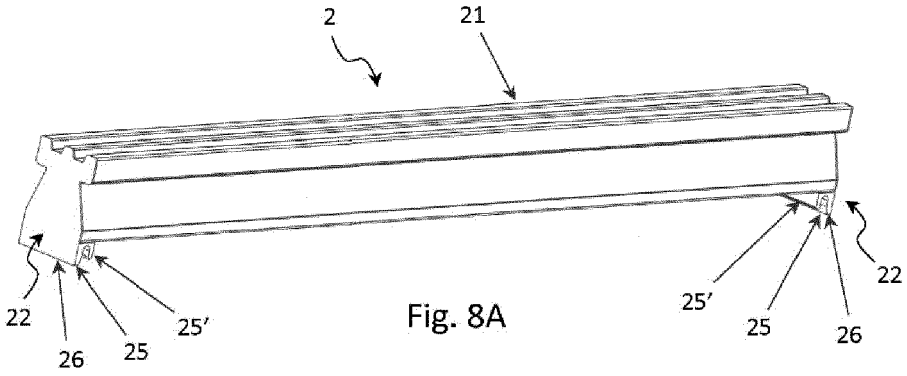


Fig. 7B


2
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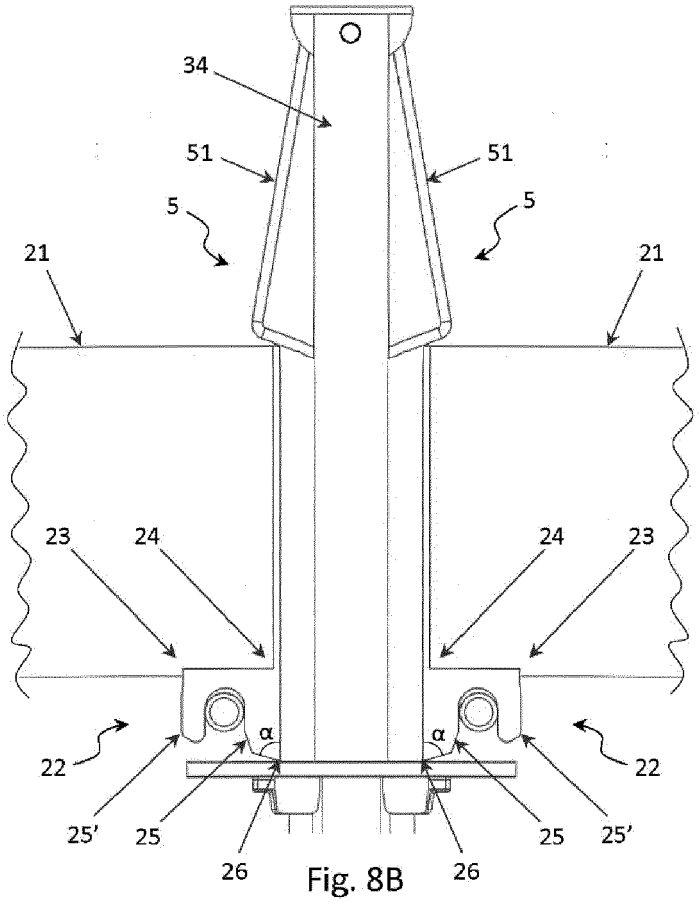
22
26
25
25'
25'
25
26
22

Fig. 8A


34
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51
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Fig. 8B

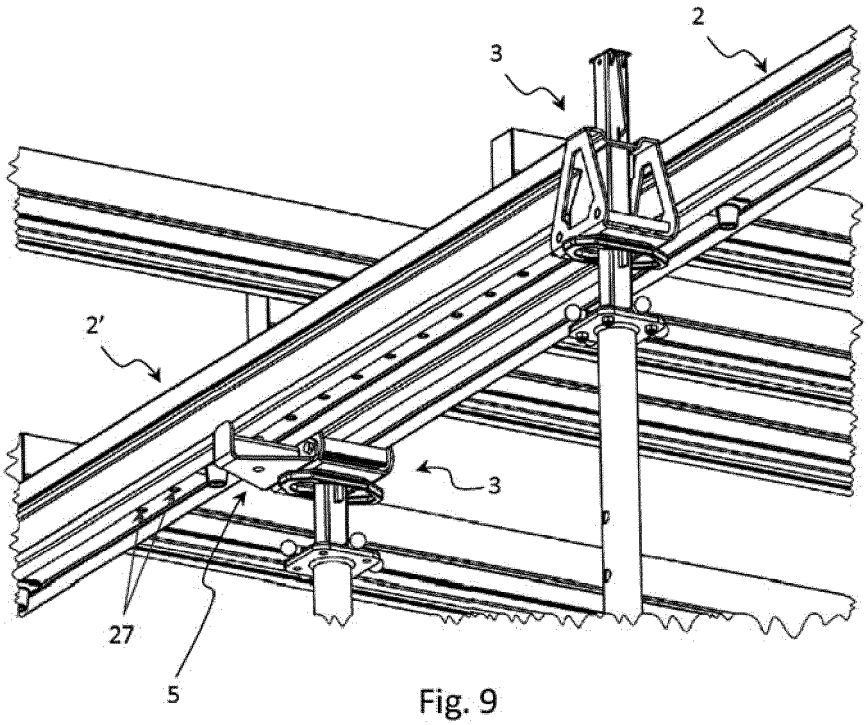

Fig. 9

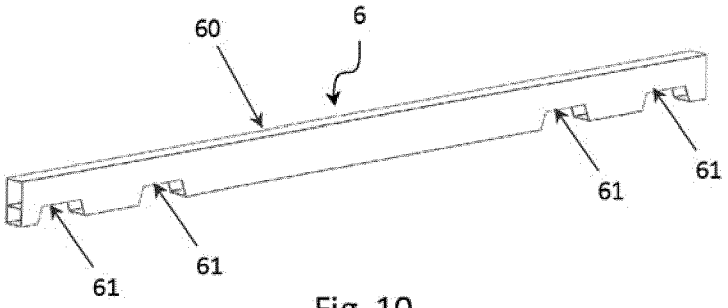

Fig. 10

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EUROPEAN SEARCH REPORT

Application Number
EP 19 38 2826

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
X	EP 1 375 781 A1 (ULMA C Y E S COOP [ES]) 2 January 2004 (2004-01-02) * paragraph [0028] - paragraph [0030]; figure 8 *	1-4	INV. E04G11/38 E04G11/48 E04G11/50
X	FR 3 021 985 A1 (ALPHI [FR]) 11 December 2015 (2015-12-11) * page 6, line 17 - page 7, line 27; figure 6 *	1-4	
X	FR 3 012 492 A1 (ALPHI [FR]) 1 May 2015 (2015-05-01) * page 4; figure 1 *	1-4	
X	DE 861 918 C (RUHRSTAHL AG) 8 January 1953 (1953-01-08) * page 2; figures 1-3 *	5-7	
X	FR 2 923 241 A1 (ALPHI SARL [FR]) 8 May 2009 (2009-05-08)	5,13-15	
A	* page 7, line 9 - page 10, line 6; figures 8,9 *	6,7	TECHNICAL FIELDS SEARCHED (IPC) E04G E04B

~~The present search report has been drawn up for all claims~~

Place of search	Date of completion of the search	Examiner
The Hague	3 June 2020	Manera, Marco

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
Y : particularly relevant if combined with another document of the same category
A : technological background
O : non-written disclosure
P : intermediate document

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)

Europäisches Patentamt
European Patent Office
Office européen des brevets

Application Number
EP 19 38 2826

CLAIMS INCURRING FEES

The present European patent application comprised at the time of filing claims for which payment was due.

☐ Only part of the claims have been paid within the prescribed time limit. The present European search report has been drawn up for those claims for which no payment was due and for those claims for which claims fees have been paid, namely claim(s):

☐ No claims fees have been paid within the prescribed time limit. The present European search report has been drawn up for those claims for which no payment was due.

LACK OF UNITY OF INVENTION

The Search Division considers that the present European patent application does not comply with the requirements of unity of invention and relates to several inventions or groups of inventions, namely:

see sheet B

☐ All further search fees have been paid within the fixed time limit. The present European search report has been drawn up for all claims.

☐ As all searchable claims could be searched without effort justifying an additional fee, the Search Division did not invite payment of any additional fee.

☒ Only part of the further search fees have been paid within the fixed time limit. The present European search report has been drawn up for those parts of the European patent application which relate to the inventions in respect of which search fees have been paid, namely claims:

5-7, 13-15

☐ None of the further search fees have been paid within the fixed time limit. The present European search report has been drawn up for those parts of the European patent application which relate to the invention first mentioned in the claims, namely claims:

☐ The present supplementary European search report has been drawn up for those parts of the European patent application which relate to the invention first mentioned in the claims (Rule 164 (1) EPC).

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LACK OF UNITY OF INVENTION
SHEET B

Application Number
EP 19 38 2826

The Search Division considers that the present European patent application does not comply with the requirements of unity of invention and relates to several inventions or groups of inventions, namely:

1. claims: 1-4

   A purlin for formwork support system

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2. claims: 5-7, 13-15

   A purlin holder for formwork support system

   ---

3. claims: 8-12

   A head for post of formwork support system

ANNEX TO THE EUROPEAN SEARCH REPORT ON EUROPEAN PATENT APPLICATION NO. EP 19 38 2826

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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03-06-2020

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
EP 1375781 A1	02-01-2004	AR 033014 A1	03-12-2003
		AT 427393 T	15-04-2009
		BR 0111650 A	01-07-2003
		EP 1375781 A1	02-01-2004
		ES 2322546 T3	23-06-2009
		PE 20021036 A1	13-01-2003
		PT 1375781 E	19-05-2009
		US 2004075043 A1	22-04-2004
		WO 02084050 A1	24-10-2002
FR 3021985 A1	11-12-2015	NONE	
FR 3012492 A1	01-05-2015	NONE	
DE 861918 C	08-01-1953	NONE	
FR 2923241 A1	08-05-2009	NONE	

EPO FORM P0459

For more details about this annex : see Official Journal of the European Patent Office, No. 12/82

REFERENCES CITED IN THE DESCRIPTION

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Patent documents cited in the description

- ES 2266434 T3 **[0002]**
- ES 2269006 A1 **[0002]**
- FR 2760482 A1 **[0002]**
- EP 0751268 A2 **[0003]**
- US 2018334818 A **[0003]**
- KR 101012088 B1 **[0003]**
- CN 105926932 A **[0003]**
- GB 2065654 A **[0003]**
- KR 201203729 U **[0004]**
- US 2018340342 A1 **[0005]**