

US Patent & Trademark Office

Patent Public Search | Text View

United States Patent
Kind Code
Date of Patent
Inventor(s)

12385263
B2
August 12, 2025
Routh; Anibrata et al.

Compensation waler assembly

Abstract

A compensation waler assembly (400) for connecting and aligning a pair of formwork panels (200) with each other is disclosed. The compensation waler assembly (400) includes a first bar (702-1), a second bar (702-2) disposed above the first bar (702-1), and a pair of hook sub-assemblies (704) disposed between the first bar (702-1) and the second bar (702-2). Each hook sub-assembly (704) is adapted to be engaged with one of the pair of formwork panels (200). Each hook sub-assembly (704) includes a hook-shaped portion (902) formed at one end of the hook sub-assembly (704) and adapted to be removably engaged with a slot formed in the respective formwork panel (200). The hook sub-assembly (704) further includes a distal portion (904) formed at the opposite end of the hook sub-assembly (704) and comprising a slot (706), and a locking component (708) adapted to be accommodated in the slot (706) to secure the hook sub-assembly (704) on the respective formwork panel (200).

Inventors:	Routh; Anibrata (Mumbai, IN), Somasundaram; Arun Kunnathally (Mumbai, IN), Challa; Sitarama Rao Naga Venkata (Mumbai, IN), Dongare; Mahesh (Mumbai, IN), Rathod; Ankush (Mumbai, IN), Raju; Vinothkumar (Mumbai, IN)
Applicant:	PERI SE (Weissenhorn, DE)
Family ID:	1000008750547
Assignee:	PERI SE (Weissenhorn, DE)
Appl. No.:	17/609759
Filed (or PCT Filed):	May 04, 2020
PCT No.:	PCT/EP2020/062315
PCT Pub. No.:	WO2020/225209
PCT Pub. Date:	November 12, 2020

Prior Publication Data

Document Identifier

US 20220228382 A1

Publication Date

Jul. 21, 2022

Foreign Application Priority Data

IN 201911018268 May. 07, 2019

Publication Classification

Int. Cl.: E04G17/04 (20060101); E04G9/02 (20060101); E04G9/04 (20060101); E04G11/08 (20060101); F16B5/06 (20060101)

U.S. Cl.:

CPC E04G17/04 (20130101); E04G9/02 (20130101); E04G9/04 (20130101); E04G11/08 (20130101); E04G17/045 (20130101); F16B5/06 (20130101); E04G2009/028 (20130101)

Field of Classification Search

CPC: E04G (17/04); E04G (17/047); E04G (9/02); E04G (11/08); E04G (2009/028); E04G (13/025); F16B (5/06)

References Cited

U.S. PATENT DOCUMENTS

Patent No.	Issued Date	Patentee Name	U.S. Cl.	CPC
1350084	12/1919	Schub	N/A	N/A
RE16736	12/1926	McMillan	269/121	E04G 13/025
1674280	12/1927	Eklof	269/122	E04G 13/025
1987076	12/1934	Pulis	249/219.1	E04G 17/045
2341993	12/1943	Jennings	N/A	N/A
2526529	12/1949	Arrighini	269/121	E04G 11/10
2862277	12/1957	Hillberg	249/219.2	E04G 11/087
3121277	12/1963	Dusselier	249/40	E04G 17/047
3137052	12/1963	Jennings	403/398	E04G 17/04
3550898	12/1969	Ursini	N/A	N/A
3712576	12/1972	Dagiel	N/A	N/A
4886234	12/1988	Schworer	249/47	E04G 17/04
5039059	12/1990	Miller	N/A	N/A
5160640	12/1991	Badstieber	N/A	N/A
5552103	12/1995	Lee	249/47	E04G 17/14
5562845	12/1995	Miller	N/A	N/A
5620628	12/1996	Ritchie, IV	249/47	E04G 11/087
6361014	12/2001	Lopez	249/40	E04G 17/042
7871055	12/2010	Dagher	428/113	E04G 9/02

8042786	12/2010	Spindler	N/A	N/A
8733727	12/2013	Vanagan	249/36	E04G 17/045
2002/0100857	12/2001	Gallis	N/A	N/A
2004/0079859	12/2003	Ward	249/33	E04G 17/06
2004/0079860	12/2003	Ward	N/A	N/A
2006/0255236	12/2005	Shidler	N/A	N/A
2008/0173788	12/2007	Brewka	249/189	E04G 17/002
2012/0286134	12/2011	Rojas Pimienta	249/192	E04G 11/12
2016/0068301	12/2015	Mitchell	24/561	B65D 11/1833
2016/0319558	12/2015	Lee	N/A	N/A
2017/0022724	12/2016	Laures	N/A	E04G 17/14
2019/0169864	12/2018	Rosati	N/A	E04G 11/08
2022/0228383	12/2021	Routh	N/A	E04G 17/045

FOREIGN PATENT DOCUMENTS

Patent No.	Application Date	Country	CPC
2179084	12/1996	CA	N/A
311730	12/1954	CH	N/A
201037314	12/2007	CN	N/A
201756793	12/2010	CN	N/A
202706551	12/2012	CN	N/A
106193584	12/2015	CN	N/A
208202569	12/2017	CN	N/A
3004395	12/1980	DE	N/A
3604252	12/1986	DE	N/A
202015006634	12/2014	DE	N/A
3144450	12/2016	EP	N/A
2429885	12/1979	FR	N/A
2484508	12/1980	FR	N/A
2607536	12/1987	FR	N/A
811383	12/1958	GB	N/A
930579	12/1962	GB	N/A
H068601	12/1993	JP	N/A
2000009117	12/1999	JP	N/A
2004156281	12/2003	JP	N/A
2007154504	12/2006	JP	N/A
100860359	12/2007	KR	N/A
20080085676	12/2007	KR	N/A
20120067074	12/2011	KR	N/A
03052217	12/2002	WO	N/A
2003052217	12/2002	WO	N/A
2005042877	12/2004	WO	N/A

Primary Examiner: Ford; Gisele D

Attorney, Agent or Firm: SLEMAN & LUND LLP

Background/Summary

FIELD OF THE INVENTION

(1) The present disclosure relates to construction industry and more particularly, relates to a compensation waler assembly adapted to connect and align a pair of formwork panels with each other.

BACKGROUND

(2) In the construction industry, wall forms or panels are generally used as supporting components to form structures, such as columns and walls. Such panels are usually made of wood having a metal frame or made entirely of metal. Based on dimensions and shape of a structure to be formed, multiple panels are installed at a construction site to form a hollow space which would correspond to the dimensions and shape of the structure. In order to form the hollow space, the panels are basically connected to each other by using various connecting mechanisms, such as pins and latches. For example, in case of forming a column, multiple panels may be connected to each other to form a hollow space in between. Thereafter, concrete or any other material may be poured from the top in the hollow space, which would then settle in to take a targeted shape of the column, by the virtue of the dimensions of the hollow space. Over a period of time, the concrete dries out and the panels are then removed to obtain the column so formed.

(3) In case of construction of larger structures, multiple panels are to be connected to each other. Any error in the connection of these panels may lead to falling of the panels causing damage at the construction site. The alignment of these panels with each other is equally critical as any error in the alignment would hamper an overall quality of the structure to be formed. Moreover, these panels are usually manufactured to have predefined dimensions. For example, panels having a dimension of 30"*30" (76.2 cm*76.2 cm) may be used to construct any structure having the dimension in the multiples of 30. However, if a structure having a dimension of 35" has to be constructed, such panels cannot be used. Rather, another panel having a dimension of 35" may have to be manufactured and used for such applications. Such customized manufacturing of these panels is not practical and incurs a significant cost.

SUMMARY

(4) This summary is provided to introduce a selection of concepts, in a simplified format, that are further described in the detailed description of the invention. This summary is neither intended to identify key or essential inventive concepts of the invention and nor is it intended for determining the scope of the invention.

(5) In an embodiment of the present disclosure, a compensation waler assembly for connecting and aligning a pair of formwork panels with each other is disclosed. The compensation waler assembly includes a first bar, a second bar disposed above the first bar, and a pair of hook sub-assemblies disposed between the first bar and the second bar. Each hook sub-assembly is adapted to be engaged with one of the pair of formwork panels. Each hook sub-assembly includes a hook-shaped portion formed at one end of the hook sub-assembly and adapted to be removably engaged with a slot formed in the respective formwork panel. The hook sub-assembly further includes a distal portion formed at the opposite end of the hook sub-assembly and comprising a slot, and a locking component adapted to be accommodated in the slot to secure the hook sub-assembly on the respective formwork panel. The pair of hook sub-assemblies is adapted to be secured on the pair of formwork panels to connect and align the formwork panels with each other.

(6) In an embodiment of the present disclosure, a compensation waler assembly for connecting and aligning a pair of formwork panels with each other is disclosed. The compensation waler assembly includes a first bar, a second bar disposed above the first bar, and a pair of hook sub-assemblies disposed between the first bar and the second bar. Each hook sub-assembly is adapted to be engaged with one of the pair of formwork panels. Each hook sub-assembly includes a hook-shaped portion formed at one end of the hook sub-assembly and adapted to be removably engaged with a slot formed in the respective formwork panel. The hook sub-assembly further includes a distal

portion formed at the opposite end of the hook sub-assembly and comprising a slot, and a locking component adapted to be accommodated in the slot to secure the hook sub-assembly on the respective formwork panel. The pair of hook sub-assemblies is adapted to move with respect to each other along the length of the first bar and the second bar, based on dimension adjustment to be made for the pair of formwork panels.

(7) In another embodiment of the present disclosure, a method of connecting and aligning a pair of formwork panels with each other through a compensation waler assembly. The method includes engaging a hook sub-assembly of the compensation waler assembly with each of the pair of formwork panels. The hook sub-assembly is disposed between a first bar and a second bar of the compensation waler assembly. The hook sub-assembly is engaged with the formwork panel by engaging a hook-shaped portion formed at one end of the hook sub-assembly with a slot formed in the respective formwork panel in a removable manner. The method further includes accommodating a locking component of the hook sub-assembly in a slot formed in a distal portion of the hook sub-assembly. The locking component is accommodated to secure the hook sub-assembly on the formwork panel.

(8) To further clarify the advantages and features of the present invention, a more particular description of the invention will be rendered by reference to specific embodiments thereof, which is illustrated in the appended drawings. It is appreciated that these drawings depict only typical embodiments of the invention and are therefore not to be considered limiting of its scope. The invention will be described and explained with additional specificity and detail with the accompanying drawings.

Description

BRIEF DESCRIPTION OF THE DRAWINGS

(1) These and other features, aspects, and advantages of the present invention will become better understood when the following detailed description is read with reference to the accompanying drawings in which like characters represent like parts throughout the drawings, wherein:

(2) FIG. 1 illustrates a perspective view of a frame of a panel, according to an embodiment of the present disclosure;

(3) FIG. 2A illustrates a perspective back view of the panel, according to an embodiment of the present disclosure;

(4) FIG. 2B illustrates a perspective front view of the panel, according to an embodiment of the present disclosure.

(5) FIG. 3A illustrates another perspective back view of the panel, according to an embodiment of the present disclosure;

(6) FIG. 3B illustrates a back view of the panel, according to an embodiment of the present disclosure;

(7) FIG. 3C illustrates another perspective back view of the panel, according to an embodiment of the present disclosure;

(8) FIG. 4 illustrates a perspective view of a pair of panels inter-connected by a compensation waler assembly, according to an embodiment of the present disclosure;

(9) FIG. 5 illustrates a front view of the pair of panels inter-connected by the compensation waler assembly, according to an embodiment of the present disclosure;

(10) FIG. 6 illustrates a top view of the pair of panels connected by the compensation waler assembly, according to an embodiment of the present disclosure;

(11) FIG. 7 illustrates a perspective view of the compensation waler assembly, according to an embodiment of the present disclosure;

(12) FIG. 8 illustrates a perspective view depicting positioning of a pair of hook sub-assemblies

within the compensation waler assembly, according to an embodiment of the present disclosure;

(13) FIG. 9 illustrates a perspective view of a hook sub-assembly, according to an embodiment of the present disclosure;

(14) FIG. 10 illustrates a schematic view of connection and alignment of vertically aligned panels with horizontally aligned panels by a plurality of compensation waler assemblies, according to an embodiment of the present disclosure; and

(15) FIG. 11 illustrates a schematic view of connection and alignment of the vertically aligned panels with the horizontally aligned panels by a plurality of compensation waler assemblies, according to another embodiment of the present disclosure.

(16) Further, skilled artisans will appreciate that elements in the drawings are illustrated for simplicity and may not have been necessarily been drawn to scale. For example, the flow charts illustrate the method in terms of the most prominent steps involved to help to improve understanding of aspects of the present invention. Furthermore, in terms of the construction of the device, one or more components of the device may have been represented in the drawings by conventional symbols, and the drawings may show only those specific details that are pertinent to understanding the embodiments of the present invention so as not to obscure the drawings with details that will be readily apparent to those of ordinary skill in the art having benefit of the description herein.

DETAILED DESCRIPTION OF FIGURES

(17) For the purpose of promoting an understanding of the principles of the invention, reference will now be made to the embodiment illustrated in the drawings and specific language will be used to describe the same. It will nevertheless be understood that no limitation of the scope of the invention is thereby intended, such alterations and further modifications in the illustrated system, and such further applications of the principles of the invention as illustrated therein being contemplated as would normally occur to one skilled in the art to which the invention relates. Unless otherwise defined, all technical and scientific terms used herein have the same meaning as commonly understood by one of ordinary skilled in the art to which this invention belongs. The system, methods, and examples provided herein are illustrative only and not intended to be limiting.

(18) For example, the term “some” as used herein may be understood as “none” or “one” or “more than one” or “all.” Therefore, the terms “none,” “one,” “more than one,” “more than one, but not all” or “all” would fall under the definition of “some.” It should be appreciated by a person skilled in the art that the terminology and structure employed herein is for describing, teaching and illuminating some embodiments and their specific features and elements and therefore, should not be construed to limit, restrict or reduce the spirit and scope of the claims or their equivalents in any way.

(19) For example, any terms used herein such as, “includes,” “comprises,” “has,” “consists,” and similar grammatical variants do not specify an exact limitation or restriction, and certainly do not exclude the possible addition of one or more features or elements, unless otherwise stated. Further, such terms must not be taken to exclude the possible removal of one or more of the listed features and elements, unless otherwise stated, for example, by using the limiting language including, but not limited to, “must comprise” or “needs to include.”

(20) Whether or not a certain feature or element was limited to being used only once, it may still be referred to as “one or more features” or “one or more elements” or “at least one feature” or “at least one element.” Furthermore, the use of the terms “one or more” or “at least one” feature or element do not preclude there being none of that feature or element, unless otherwise specified by limiting language including, but not limited to, “there needs to be one or more . . .” or “one or more element is required.”

(21) Unless otherwise defined, all terms and especially any technical and/or scientific terms, used herein may be taken to have the same meaning as commonly understood by a person ordinarily

skilled in the art.

(22) Reference is made herein to some “embodiments.” It should be understood that an embodiment is an example of a possible implementation of any features and/or elements presented in the attached claims. Some embodiments have been described for the purpose of explaining one or more of the potential ways in which the specific features and/or elements of the attached claims fulfil the requirements of uniqueness, utility, and non-obviousness.

(23) Use of the phrases and/or terms including, but not limited to, “a first embodiment,” “a further embodiment,” “an alternate embodiment,” “one embodiment,” “an embodiment,” “multiple embodiments,” “some embodiments,” “other embodiments,” “further embodiment”, “furthermore embodiment”, “additional embodiment” or other variants thereof do not necessarily refer to the same embodiments. Unless otherwise specified, one or more particular features and/or elements described in connection with one or more embodiments may be found in one embodiment, or may be found in more than one embodiment, or may be found in all embodiments, or may be found in no embodiments. Although one or more features and/or elements may be described herein in the context of only a single embodiment, or in the context of more than one embodiment, or in the context of all embodiments, the features and/or elements may instead be provided separately or in any appropriate combination or not at all. Conversely, any features and/or elements described in the context of separate embodiments may alternatively be realized as existing together in the context of a single embodiment.

(24) Any particular and all details set forth herein are used in the context of some embodiments and therefore should not necessarily be taken as limiting factors to the attached claims. The attached claims and their legal equivalents can be realized in the context of embodiments other than the ones used as illustrative examples in the description below.

(25) Embodiments of the present invention will be described below in detail with reference to the accompanying drawings.

(26) For the sake of clarity, the first digit of a reference numeral of each component of the present disclosure is indicative of the Figure number, in which the corresponding component is shown. For example, reference numerals starting with digit “1” are shown at least in FIG. 1. Similarly, reference numerals starting with digit “2” are shown at least in FIG. 2.

(27) In an embodiment of the present disclosure, a compensation waler assembly adapted to connect a pair of formwork panels while accommodating any adjustment that has to be made in terms of dimensions of a structure to be formed is disclosed. The compensation waler assembly includes a pair of bars and a pair of hook sub-assemblies disposed between the pair of bars. The pair of bars is disposed on anchor struts of the pair of formwork panels by engaging hook portions of the hook sub-assemblies in slots as provided within the anchor struts. The compensation waler assembly is adapted to operate to adjust for any dimensional limitation of the formwork panels for forming any structure of any dimension.

(28) FIG. 1 illustrates a perspective view of a frame **100** of a formwork panel, according to an embodiment of the present disclosure. The formwork panel may hereinafter interchangeably be referred to as the panel. FIG. 2A illustrates a perspective back view of the panel **200**, according to an embodiment of the present disclosure. FIG. 2B illustrates a perspective front view of the panel **200**, according to an embodiment of the present disclosure. FIG. 2A and FIG. 2B may hereinafter collectively be referred to as FIG. 2. In order to avoid duplicity of information, FIG. 1 and FIG. 2 are explained in conjunction with each other. In an embodiment, the panel **200** may be adapted to be used for construction of structures, such as walls and columns.

(29) Although the present disclosure is explained with respect to application of the panel **200** in the field of construction, the application of the panel **200** should not be construed to be limited to the construction industry only. In fact, the panel **200** can be used in any other application, without departing from the scope of the present disclosure.

(30) In an embodiment, the panel **200** may include, but is not limited to, the frame **100** and a flat

portion **202** fixed to the frame **100**. The flat portion **202** may come in contact with concrete or any other variant during the construction of the structure. Therefore, the shape or profile of the flat portion **202** may depend on the profile of the structure to be formed. In an embodiment, the flat portion **202** may be formed of at least one of composite ply-board, Birch ply-board, a polypropylene board, and local ply-board. In an embodiment, the flat portion **202** may interchangeably be referred to as form-lining, without departing from the scope of the present disclosure. In an example, the flat portion **202** may have a thickness of 12-13 mm. Further, the flat portion **202** may be conveniently replaced at the construction site.

(31) Further, the frame **100** may be formed of high-grade steel. In an embodiment, the frame **100** may include at least one anchor strut **204**. In the illustrated embodiment, the frame **100** includes a pair of anchor struts **204**, individually referred to as **204-1** and **204-2**. Each anchor strut **204** may have a plurality of support pillars **206** for accommodating mounting of a compensation waler assembly to connect multiple frames and adjust to the extra dimensions of the structure to be formed. In an example, the support pillars **206** may be cylindrical in shape. The support pillars **206** may individually be referred to as **206-1**, **206-2**, **206-3**, and **206-4**. Constructional and operational details of the compensation waler assembly are explained in detail in the description of subsequent Figures. The anchor struts **204** may also have edge stiffening for extra robustness.

(32) FIG. 3A illustrates another perspective back view of the panel **200**, according to an embodiment of the present disclosure. FIG. 3B illustrates a back view of the panel **200**, according to an embodiment of the present disclosure. FIG. 3C illustrates another perspective back view of the panel **200**, according to an embodiment of the present disclosure. FIG. 3A, FIG. 3B, and FIG. 3C may hereinafter collectively be referred to as FIG. 3.

(33) Referring to FIG. 1, FIG. 2, and FIG. 3, in an embodiment, a total weight of the panel **200** may vary within a range of 40 kg to 50 kg. Further, in an example, maximum column size that can be formed using the panel **200** is 900 mm×900 mm, for example, by using four panels **200** having width of 900 mm. Further, a design pressure of 60 kN/Sq.Math.m and 75 kN/Sq.Math.m may be applicable for the construction of the walls and the columns, respectively, by using the panel **200** of the present disclosure.

(34) FIG. 4 illustrates a perspective view of the pair of panels **200** inter-connected by a compensation waler assembly **400**, according to an embodiment of the present disclosure. The compensation waler assembly **400** is adapted to connect the panels **200** in order to accommodate an extra dimensional requirement of a structure to be formed. In an embodiment, the compensation waler assembly **400** may connect the panels **200** with or without infills between them. FIG. 5 illustrates a front view of the pair of panels **200** inter-connected by the compensation waler assembly **400**, according to an embodiment of the present disclosure. FIG. 6 illustrates a top view of the pair of panels **200** connected by the compensation waler assembly **400**, according to an embodiment of the present disclosure.

(35) Referring to FIG. 4, FIG. 5, and FIG. 6, in an example where a width of each panel **200** is 30 cm and a wall of 65 cm is to be made, the compensation waler assembly **400** may be used. The compensation waler assembly **400** may compensate for the extra 5 cm. As shown in the FIGS. 4-6, in order to compensate for the extra 5 cm, a pair of compensators **402** is disposed between the panels **200-1** and **200-2**. Therefore, on each side of the concrete, the two panels **200** of 30 cm each and the compensator **402** of 5 cm may be disposed to form a wall of 65 cm. The pair of compensators **402** may be accommodated between the panels **200-1** and **200-2** owing to the connection by the compensation waler assembly **400**. In an embodiment, the pair of compensators **402** is made of timber. It should be appreciated by a person skilled in the art that the dimensions are mentioned merely for explanatory purposes and therefore, should not be construed as limiting in any way.

(36) FIG. 7 illustrates a perspective view of the compensation waler assembly **400**, according to an embodiment of the present disclosure. Referring to FIG. 4, FIG. 5, FIG. 6, and FIG. 7, the

compensation waler assembly **400** may include, but is not limited to, a pair of bars **702** and a pair of hook sub-assemblies **704** disposed between the pair of bars **702**. The pair of bars **702** may individually be referred to as a first bar **702-1** and a second bar **702-2** disposed above the first bar **702-1**. Similarly, the pair of hook sub-assemblies **704** may individually be referred to as a hook sub-assembly **704-1** and a hook sub-assembly **704-2**. In an embodiment, the hook sub-assemblies **704** may individually be referred to as the hook sub-assembly **704**.

(37) FIG. **8** illustrates a perspective view of the compensation waler assembly **400** depicting positioning of the hook sub-assemblies **704** within the compensation waler assembly **400**, according to an embodiment of the present disclosure. FIG. **9** illustrates a perspective view of a hook sub-assembly **704**, according to an embodiment of the present disclosure. Referring to FIG. **7**, FIG. **8**, and FIG. **9**, each hook sub-assembly **704** is adapted to be engaged with one of the pair of panels **200**. The subsequent description is explained with respect to one of the hook sub-assemblies **704**. However, as would be appreciated by a person skilled in the art, the description is equally application to both the hook sub-assemblies **704**, without departing from the scope of the present disclosure.

(38) Referring to FIGS. **4-9**, the hook sub-assembly **704** may include, but is not limited to, a hook-shaped portion **902** formed on one end and a distal portion **904** formed at the opposite end. The hook-shaped portion **902** is adapted to be engaged with a slot formed in the respective panel **200**. The slot may be any supporting structure of the panel **200** that is adapted to engage the hook-shaped portion **902**. In an embodiment, the hook-shaped portion **902** may be adapted to engage with the anchor strut **204** of the panel **200**. Particularly, the hook-shaped portion **902** may be adapted to engage with the support pillar **206** of the anchor strut **204**. Further, the distal portion **904** may include a slot **906**. The hook sub-assembly **704** may further include a locking component **908** adapted to be accommodated in the slot **906** to secure the hook-sub-assembly **704** on the respective panel **200**. In an embodiment, the locking component **908** may include, but is not limited to, a wedge and a bolt. As would be appreciated by a person skilled in the art, the locking component **908** may be selected based on the constructional characteristics of the slot **906** and may be of any form that can achieve effective locking.

(39) Therefore, the bars **702** may be disposed on the anchor struts **204** of the panels **200**, for example, by engaging the hook-shaped portions **902** of the hook sub-assemblies **704** with a corresponding component of the anchor struts **204**. The hook sub-assemblies **704** are therefore adapted to be secured on the panels **200** to connect and align the panels **200** with each other.

(40) In an embodiment, as illustrated, the hook sub-assembly **704** is disposed between the bars **702** such that the hook-shaped portion **902** and the distal portion **904** are extended out of the bars **702**. Moreover, in an embodiment, the hook sub-assemblies **704** are adapted to move with respect to each other along the length of the bars **702**. The hook sub-assemblies **704** may be moved based on dimension adjustment to be made for the panels **200**. Therefore, the hook sub-assemblies **704** move to accommodate the extra dimension of the structure to be formed, with respect to the dimensions of the panels **200**. For example, the hook sub-assemblies **704** may be moved farther away from each other to accommodate an increase in the extra dimensions.

(41) In an embodiment, the hook-shaped portion **902** may be adapted to rotate for aligning to engage with any supporting portion of the panel **200**. In an embodiment, the hook-shaped portion **902** may be adapted to rotate by 360 degrees. In such an embodiment, the construction of the hook-shaped portion **902** may be different from the illustrated embodiment, for example, in order to accommodate the rotation aspect. Owing to the rotatable aspect of the hook-shaped portion **902**, the compensation waler assembly **400** may be adapted to align itself with any surface, for example, with supporting elements of the anchor struts **204**. Therefore, the compensation waler assembly **400** may be installed in any alignment based on the joint to be formed between the panels **200**.

(42) In an embodiment, the compensation waler assembly **400** may be adapted to connect a vertically aligned panel **200** with a horizontally aligned panel **200**. FIG. **10** illustrates a schematic

view of connection and alignment of vertically aligned panels **200** with the horizontally aligned panels **200** by a plurality of compensation waler assemblies **400**, according to an embodiment of the present disclosure. Similarly, FIG. **11** illustrates a schematic view of connection and alignment of vertically aligned panels **200** with the horizontally aligned panels **200** by a plurality of compensation waler assemblies **400**, according to another embodiment of the present disclosure. Referring to FIG. **10** and FIG. **11**, the connected formwork panels **200** are shown to be lifted through chains **1000** of a crane or any other similar heavy machine. As illustrated, the compensation waler assembly **400** is also capable of connecting and aligning the vertically aligned panels **200** with horizontally aligned panels **200**. In an example, the compensation waler assembly **400** may be inclined up to 12 degrees in order to enable such connections. This would provide additional robustness to the structure, and avoid the possibility of any misalignment of the panel structure during transportation.

(43) In an embodiment, a method of connecting and aligning the pair of formwork panels **200** with each other through the compensation waler assembly **400** is also disclosed. The method may include, but is not limited to, engaging the hook sub-assembly **704** with each of the pair of formwork panels **200**. The hook sub-assembly **704** is engaged with the formwork panel **200** by engaging the hook-shaped portion **902** formed at one end of the hook sub-assembly **704** with the slot formed in the respective formwork panel **200** in a removable manner. Further, the method includes accommodating the locking component **908** of the hook sub-assembly **704** in the slot **906** formed in the distal portion **902**. The locking component **908** is accommodated to secure the hook sub-assembly **704** on the formwork panel **200**.

(44) As would be gathered, the panel **200** and the compensation waler assembly **400** of the present disclosure offer a comprehensive approach for construction of the structures, such as walls and columns. Firstly, owing to the use of high-grade steel for the frame **100** and corresponding supporting beams, the panels **200** so formed are robust. Further, the form-lining or the flat portion **202** of the panel **200** ensures best form finish of the structure formed. Considering the convenience of assembling and disassembling the panels **200**, time taken for forming the structure is also significantly reduced.

(45) In an embodiment, by using the panel **200** and the compensation waler assembly **400** of the present disclosure, any wall or column of varying dimensions can be conveniently formed. For constructing a structure, firstly, a form release agent may be sprayed on the equipment so that the concrete does not stick to any of the equipment. After the spraying, a number of panels **200** may be placed in conjunction with each other, based on dimensions of the structure to be formed. The panels **200** may be connected to each other by using the compensation waler assembly **400**. Particularly, when any adjustment is required with respect to the dimensions of the structure and the panels **200**, the compensation waler assembly **400** may be used to compensate for the difference in dimensions.

(46) The compensation waler assembly **400** has a simple structure and includes fewer components. Further, the compensation waler assembly **400** is formed such that it can be conveniently engaged with any surface of the panels **200**. Instead of requiring an interface component for enabling the connection between the panel **200** and the compensation waler assembly **400**, the hook-shaped portion **902** is formed such that it can directly engage with any supporting structure of the panel **200**. Moreover, it does not require any complicated and expensive fastening system to secure the connection. The hook-shaped portion **902** is structured such that it easily engages with the panel **200**, without requiring any specialized tool.

(47) By providing simple and durable construction of the compensation waler assembly **400**, an overall strength and rigidity to the structure are ensured. Moreover, the compensation waler assembly **400** can be easily installed and uninstalled at the site. Therefore, the panel **200** and the compensation waler assembly **400** of the present disclosure are safe, risk-free, flexible in implementation, cost-effective, convenient, easy to install and uninstall, and have a wide range of

applications.

(48) While specific language has been used to describe the present subject matter, any limitations arising on account thereto, are not intended. As would be apparent to a person in the art, various working modifications may be made to the method in order to implement the inventive concept as taught herein. The drawings and the foregoing description give examples of embodiments. Those skilled in the art will appreciate that one or more of the described elements may well be combined into a single functional element. Alternatively, certain elements may be split into multiple functional elements. Elements from one embodiment may be added to another embodiment.

Claims

1. A compensation waler assembly for connecting and aligning a pair of formwork panels with each other, the compensation waler assembly comprising: a first bar; a second bar disposed above the first bar; and a pair of hook sub-assemblies disposed between the first bar and the second bar, each hook sub-assembly adapted to be engaged with one of the pair of formwork panels, and each hook sub-assembly comprising: a hook-shaped portion formed at one end of the hook sub-assembly and adapted to be removably engaged with a first slot formed in the respective formwork panel; a distal portion formed at the opposite end of the hook sub-assembly and comprising a second slot; and a locking component adapted to be accommodated in the second slot to secure the hook sub-assembly on the respective formwork panel, wherein the pair of hook sub-assemblies is adapted to be secured on the pair of formwork panels to connect and align the formwork panels with each other; and wherein the hook-shaped portion is adapted to rotate by 360 degrees for aligning to engage with any supporting portion of the formwork panel.
2. The compensation waler assembly of claim 1, wherein each hook sub-assembly is disposed between the first bar and the second bar such that the respective hook-shaped portion and the respective distal portion are extended out of the first bar and the second bar.
3. The compensation waler assembly of claim 1, wherein the pair of hook sub-assemblies is adapted to move with respect to each other along the length of the first bar and the second bar, based on dimension adjustment to be made for the pair of formwork panels.
4. The compensation waler assembly of claim 1, wherein the hook-shaped portion of the hook sub-assembly is adapted to be engaged with an anchor strut of the formwork panel.
5. The compensation waler assembly of claim 1, wherein the hook-shaped portion of the hook sub-assembly is adapted to be engaged with a support pillar of an anchor strut of the formwork panel.
6. A compensation waler assembly for connecting and aligning a pair of formwork panels with each other, the compensation waler assembly comprising: a first bar; a second bar disposed above the first bar; and a pair of hook sub-assemblies disposed between the first bar and the second bar, each hook sub-assembly adapted to be engaged with one of the pair of formwork panels, and each hook sub-assembly comprising: a hook-shaped portion formed at one end of the hook sub-assembly and adapted to be removably engaged with a first slot formed in the respective formwork panel; a distal portion formed at the opposite end of the hook sub-assembly and comprising a second slot; and a locking component adapted to be accommodated in the second slot to secure the hook sub-assembly on the respective formwork panel, wherein the pair of hook sub-assemblies is adapted to move with respect to each other along the length of the first bar and the second bar, based on dimension adjustment to be made for the pair of formwork panels, and wherein the hook-shaped portion is adapted to rotate by 360 degrees for aligning to engage with any supporting portion of the formwork panel.
7. The compensation waler assembly of claim 6, wherein the hook-shaped portion of the hook sub-assembly is adapted to be engaged with an anchor strut of the formwork panel.
8. The compensation waler assembly of claim 6, wherein the hook-shaped portion of the hook sub-assembly is adapted to be engaged with a support pillar of an anchor strut of the formwork panel.

9. A method of connecting and aligning a pair of formwork panels with each other through a compensation waler assembly, the method comprising: engaging a hook sub-assembly of the compensation waler assembly with each of the pair of formwork panels, wherein the hook sub-assembly is disposed between a first bar and a second bar of the compensation waler assembly, the hook sub-assembly is engaged with the formwork panel by: engaging a hook-shaped portion formed at one end of the hook sub-assembly with a first slot formed in the respective formwork panel in a removable manner; and accommodating a locking component of the hook sub-assembly in a second slot formed in a distal portion of the hook sub-assembly, wherein the locking component is accommodated to secure the hook sub-assembly on the respective formwork panel, wherein the hook-shaped portion is adapted to rotate by 360 degrees for aligning to engage with any supporting portion of the formwork panel.
