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Inventor(s)	Brimmer; Wray Kenneth et al.

SYSTEMS AND METHODS OF A POOL FORM ASSEMBLY

Abstract

Various embodiments are provided herein for a formwork system and corresponding assembly method, the formwork system including at least two C-shaped channel forms each having a first end and a second end, each C-shaped channel form comprising a web, a top flange, and a bottom flange, wherein the top flange and the bottom flange are separated by a channel distance, a C-shaped connector for connecting the second end of a first C-shaped channel form to the first end of a second C-shaped channel form, the C-shaped connector comprising a web, a top flange and a bottom flange, wherein the top flange and the bottom flange are separated by a connector distance, wherein the connector distance is smaller than the channel distance. In some embodiments, the top flanges and the bottom flanges include engagement members for alignment purposes.

Inventors: **Brimmer; Wray Kenneth (Paris, CA), Brimmer; Stacey Anne (Paris, CA)**

Applicant: **Brimmer; Wray Kenneth** (Paris, CA); **Brimmer; Stacey Anne** (Paris, CA)

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Background/Summary

CROSS-REFERENCE TO RELATED APPLICATIONS [0001] This application claims the benefit of U.S. Provisional Patent Application No. 63/551,587, filed Feb. 9, 2024. The entire contents of U.S. Provisional Patent Application No. 63/551,587 is hereby incorporated by reference for all purposes.

FIELD
[0002] Various embodiments are described herein of a system and corresponding method for a formwork assembly of a form assembly such as for concrete for a pool or decking system, or for walkways, driveways, sidewalks and the like.
INTRODUCTION
[0003] The following paragraphs are provided by way of background. They are not, however, an admission that anything discussed therein is prior art or part of the knowledge of persons skilled in the art.
[0004] Traditional formwork systems also known as concrete flat work systems (such as for use with pool and deck construction) are built using a multitude of wooden boards that are attached together using additional wooden boards and screws/nails. These formwork systems require high quality wood to ensure the lines of the resulting decking are straight, and can take a long time to construct and disassemble. Additionally, these formworks are usually non-reusable, as the shape is static and un-adjustable.
[0005] Setting up these formwork systems to create decking around pools, firepits, walkways, sidewalks, etc. can require a large number of workers to gather all required wooden materials, assemble the formwork, disassemble the formwork, and then dispose of the formwork.
[0006] The inventors have determined that it would be beneficial to have systems and methods that allow for easy construction and disassembly of formworks that might require less manpower, decreased time for installation and disassembly, and may improve the re-use of forms.
SUMMARY
[0007] In one broad aspect, in accordance with the teachings herein, there is provided a formwork system including at least two C-shaped channel forms each having a first end and a second end, each C-shaped channel form comprising a web, a top flange, and a bottom flange, wherein the top flange and the bottom flange are separated by a channel distance, a C-shaped connector for connecting the second end of a first C-shaped channel form to the first end of a second C-shaped channel form, the C-shaped connector comprising a web, a top flange and a bottom flange, wherein the top flange and the bottom flange are separated by a connector distance, wherein the connector distance is smaller than the channel distance.
[0008] In some examples, the top flange and the bottom flange of each of the C-shaped channel forms and the C-shaped connector comprise at least one engagement member for aligning the C-shaped connector with at least one of the C-shaped channel forms.
[0009] In some examples, the at least one engagement member comprises alignment slots for aligning the C-shaped connector with at least one of the C-shaped channel forms. In some examples, the alignment slots are sized and shaped for receiving at least one of a bolt, screw, a steel forming stake, or pin.
[0010] In some examples, the C-shaped connector is an angle C-shaped connector having a first arm extending along a first axis and a second arm extending along a second axis, the first arm for connecting to the second end of the first C-shaped channel form and the second arm for connecting to the first end of the second C-shaped channel form.

[0011] In some examples, the angle C-shaped connector is at a 90 degree angle.
[0012] In some examples, at least some of the C-shaped channel forms and the C-shaped connectors are formed of galvanized steel.
[0013] In some examples, at least some of the C-shaped channel forms and the C-shaped connectors are formed of galvannealed steel.
[0014] In some examples, the C-shaped channel forms are of a length anywhere between 12 inches and 120 inches.
[0015] In some examples, the C-shaped channel forms are curved.
[0016] In some examples, when the second end of the first C-shaped channel form is connected to the first end of the second C-shaped channel form, the second end of the first C-shaped channel form and the first end of the second C-shaped channel form align to create a smooth surface.
[0017] In another broad aspect, in accordance with the teachings herein, there is provided a kit for assembling a formwork system, the kit including at least one C-shaped channel form as described in any one of the previous examples, at least one C-shaped connector as described in any one of the previous examples, at least one angle C-shaped connector as described in a previous example
[0018] In some examples, the kit includes four angle C-shaped connectors, at least 12 C-shaped channel forms, and at least 10 C-shaped connectors.
[0019] In some examples, the kit includes one or more of steel forming stakes, pins, screws or bolts for receiving within the C-shaped channel forms and C-shaped connectors.
[0020] In another broad aspect, in accordance with the teachings herein, there is provided a method of assembling a formwork system, the method including (a) inserting a first end of a C-shaped connector within a first C-shaped channel form, (b) inserting a second end of the C-shaped connector within a second C-shaped channel form, (c) aligning at least one engagement member of the C-shaped channel forms and at least one engagement member of the C-shaped connector; and (d) securing the first and second C-shaped channel forms to the C-shaped connector using the respective engagement members.
[0021] In some examples, the method includes repeating steps (a) through (d) with additional C-shaped connectors and C-shaped channel forms to create a desired shape.
[0022] In some examples, the C-shaped connector is an angle C-shaped connector having a first arm extending along a first axis and a second arm extending along a second axis, the first arm for connecting to the second end of the first C-shaped channel form and the second arm for connecting to the first end of the second C-shaped channel form.
[0023] In some examples, the C-shaped connectors and the C-shaped channel forms each comprise a web, a top flange, and a bottom flange, the top flange and the bottom flange each comprising at least one engagement member for aligning the C-shaped connector with at least one of the C-shaped channel forms.
[0024] In some examples, step (d) further comprises securing the C-shaped channel forms with the C-shaped connector with a steel forming stake, a pin, or a bolt.
[0025] In some examples, the method further includes (e) pouring a concrete material within the formwork, wherein the concrete material forms into a concrete slab.
[0026] In some examples, the method further includes (f) removing the C-shaped channel forms and the C-shaped connector from the concrete slab for re-assembly.
[0027] Other features and advantages of the present application will become apparent from the following detailed description taken together with the accompanying drawings. It should be understood, however, that the detailed description and the specific examples, while indicating preferred embodiments of the application, are given by way of illustration only, since various changes and modifications within the spirit and scope of the application will become apparent to those skilled in the art from this detailed description.

Description

BRIEF DESCRIPTION OF THE DRAWINGS

[0028] For a better understanding of the various embodiments described herein, and to show more clearly how these various embodiments may be carried into effect, reference will be made, by way of example, to the accompanying drawings which show at least one example embodiment, and which are now described. The drawings are not intended to limit the scope of the teachings described herein.

[0029] FIG. **1** is a perspective view of an example embodiment of the assembled formwork system;

[0030] FIG. **2**A is a front view of an example embodiment of a channel form;

[0031] FIG. **2**B is a side view of the example channel form of FIG. **2**A;

[0032] FIG. **2**C is a top view of the example channel form of FIG. **2**A;

[0033] FIG. **2**D is a perspective view of the example channel form of FIG. **2**A;

[0034] FIG. **3**A is a front view of another example embodiment of a channel form;

[0035] FIG. **3**B is a side view of the example channel form of FIG. **3**A;

[0036] FIG. **3**C is a top view of the example channel form of FIG. **3**A;

[0037] FIG. **3**D is a perspective view of the example channel form of FIG. **3**A;

[0038] FIG. **4**A is a front view of an example embodiment of a connector;

[0039] FIG. **4**B is a top view of the example connector of FIG. **4**A;

[0040] FIG. **4**C is a top view of the example connector of FIG. **4**A;

[0041] FIG. **4**D is a perspective view of the example connector of FIG. **4**A;

[0042] FIG. **5** is a perspective view of an example connector assembled with two example channel forms;

[0043] FIG. **6**A is a perspective view of an example embodiment of the first arm of an angle connector;

[0044] FIG. **6**B is a perspective view of the example angle connector of FIG. **6**A;

[0045] FIG. **7**A is a perspective view of another example embodiment of the first arm of an angle connector;

[0046] FIG. **7**B is a perspective view of the example angle connector of FIG. **7**A;

[0047] FIG. **8** is a perspective view of an example angle connector assembled with two example channel forms;

[0048] FIG. **9** is a perspective view of an example embodiment of a curved channel form;

[0049] FIG. **10**A is a perspective view of an example embodiment of an angle connector having a variable angle;

[0050] FIG. **10**B is an overhead view of the angle connector of FIG. **10**A;

[0051] FIG. **10**C is an elevation view of the angle connector of FIG. **10**A;

[0052] FIG. **11** is a perspective view of a connector according to one embodiment for use with flex forms, such as the flex forms shown in FIG. **14**A and FIG. **14**B;

[0053] FIG. **12**A a is a perspective of a notched filler according to one embodiment;

[0054] FIG. **12**B is an elevation view of the notched filler of FIG. **12**A;

[0055] FIG. **13** is a perspective view of an angle connector according to another embodiment;

[0056] FIG. **14**A is an elevation view of a flexible form according to one embodiment;

[0057] FIG. **14**B is an overhead view of the flexible form of FIG. **14**A; and

[0058] FIG. **15** is a perspective view of a straight beam according to another embodiment;

[0059] Further aspects and features of the example embodiments described herein will appear from the following description taken together with the accompanying drawings.

DETAILED DESCRIPTION OF THE EMBODIMENTS

[0060] The headings and Abstract of the Disclosure provided herein are for convenience only and do not interpret the scope or meaning of the embodiments.

[0061] Various embodiments in accordance with the teachings herein will be described below to provide an example of at least one embodiment of the claimed subject matter. No embodiment described herein limits any claimed subject matter. The claimed subject matter is not limited to devices, systems, or methods having all of the features of any one of the devices, systems, or methods described below or to features common to multiple or all of the devices, systems, or methods described herein. It is possible that there may be a device, system, or method described herein that is not an embodiment of any claimed subject matter. Any subject matter that is described herein that is not claimed in this document may be the subject matter of another protective instrument, for example, a continuing patent application, and the applicants, inventors, or owners do not intend to abandon, disclaim, or dedicate to the public any such subject matter by its disclosure in this document.
[0062] It will be appreciated that for simplicity and clarity of illustration, where considered appropriate, reference numerals may be repeated among the figures to indicate corresponding or analogous elements. In addition, numerous specific details are set forth in order to provide a thorough understanding of the embodiments described herein. However, it will be understood by those of ordinary skill in the art that the embodiments described herein may be practiced without these specific details. In other instances, well-known methods, procedures, and components have not been described in detail so as not to obscure the embodiments described herein. Also, the description is not to be considered as limiting the scope of the embodiments described herein.
[0063] It should also be noted that the terms “coupled” or “coupling” as used herein can have several different meanings depending in the context in which these terms are used. For example, the terms coupled or coupling can have a mechanical, structural or fluidic connotation. For example, as used herein, the terms coupled or coupling can indicate that two elements or devices can be directly connected to one another or connected to one another through one or more intermediate elements or devices via a mechanical element, a structural element, a gas flow or a fluid flow depending on the particular context.
[0064] Unless the context requires otherwise, throughout the specification and claims which follow, the word “comprise” and variations thereof, such as, “comprises” and “comprising” are to be construed in an open, inclusive sense, that is, as “including, but not limited to”.
[0065] It should also be noted that, as used herein, the wording “and/or” is intended to represent an inclusive-or. That is, “X and/or Y” is intended to mean X or Y or both, for example. As a further example, “X, Y, and/or Z” is intended to mean X or Y or Z or any combination thereof.
[0066] It should be noted that terms of degree such as “substantially”, “about” and “approximately” as used herein mean a reasonable amount of deviation of the modified term such that the end result is not significantly changed. These terms of degree may also be construed as including a deviation of the modified term, such as by 1%, 2%, 5%, or 20%, for example, if this deviation does not negate the meaning of the term it modifies.
[0067] Furthermore, the recitation of numerical ranges by endpoints herein includes all numbers and fractions subsumed within that range (e.g., **1** to **5** includes 1, 1.5, 2, 2.75, 3, 3.90, 4, and 5). It is also to be understood that all numbers and fractions thereof are presumed to be modified by the term “about” which means a variation of up to a certain amount of the number to which reference is being made if the end result is not significantly changed, such as 1%, 2%, 5%, or 10%, for example.
[0068] Reference throughout this specification to “one embodiment”, “an embodiment”, “at least one embodiment” or “some embodiments” means that one or more particular features, structures, or characteristics may be combined in any suitable manner in one or more embodiments, unless otherwise specified to be not combinable or to be alternative options.
[0069] As used in this specification and the appended claims, the singular forms “a,” “an,” and “the” include plural referents unless the content clearly dictates otherwise. It should also be noted that the term “or” is generally employed in its broadest sense, that is, as meaning “and/or” unless

the content clearly dictates otherwise.
[0070] As mentioned, methods of assembling forms for concrete flatwork including: concrete decking, pools, firepits, sidewalks, shed pads, sidewalks & patios etc. can be a tedious process of finding non-warped wood for the forms, assembling with additional formwork pieces, lubricating with tape and/or spray lubricants, and disassembling the formwork after the concrete has cured. In each method, the formwork is able to be used once or twice at the most, and requires a higher level of manpower & labor costs to ensure that the alignment and level of the form is accurate. A formwork system and corresponding method of assembly is required to allow assembly and pouring of these concrete structures with a decreased assembly time and man power required and an ability to re-use the forms to decrease waste from these services.
[0071] In accordance with the teachings herein, there are provided various example embodiments of formwork systems that may be used to quickly assemble and disassemble formwork, while ensuring accuracy of the concrete pours.
[0072] Referring now to FIG. **1**, a perspective view of an example embodiment of the formwork system **100** in accordance with the teachings herein is shown. The formwork system **100** can include multiple C-shaped channel forms **200**, multiple C-shaped connectors **300**, and multiple angle C-shaped connectors **400**. In some embodiments, the formwork system **100** can include two C-shaped channel forms **200** and one C-shaped connector **300** or one angle C-shaped connector **400**. In some embodiments, any combination of C-shaped channel forms **200**, C-shaped connectors **300** and angle C-shaped connectors **400** can be used to create the desired formwork shape.
[0073] Referring now to FIGS. **2**A-**2**D, shown are multiple views of an example embodiment of C-shaped channel forms **200**. In FIGS. **2**A-**2**C, shown is an example embodiment of channel form **200** having a length of 12 inches. As shown, in some examples the channel forms **200** can have a length of anywhere between around 12 inches (one foot) and around 120 inches (10 feet) and a height of around 5.5 inches. In some embodiments, channel forms **200** can have a length of around 24 inches (2 feet), 48 inches (4 feet), 72 inches (6 feet), or 96 inches (8 feet). In some embodiments, channel forms **200** can have a height of anywhere between 4 inches and 12 inches (one foot). These multiple length options for the channel forms **200** can allow for versatility in many different applications.
[0074] Channel form **200** is a C-shaped channel having a first end **220**, a second end **222**, web **202**, a top flange **204**, and a bottom flange **206**. The web **202**, top flange **204** and bottom flange **206** of channel form **200** can define an interior volume **214**. In the illustrated embodiment, channel form **200** has two engagement members **208***a*, **208***b* on the top flange **204** and two engagement member **208***c*, **208***d* on the bottom flange **206**. In some embodiments, top flange **204** and bottom flange **206** can each have more than two engagement members **208**.
[0075] In the illustrated embodiments, top flange **204** and bottom flange **206** extend from web **202** in the same direction. Top flange **204** can further include a downwardly extending portion **210**, which is substantially parallel to web **202** and substantially perpendicular to top flange **204**. Bottom flange **206** can include an upwardly extending portion **212**, which is substantially parallel to web **202** and substantially perpendicular to bottom flange **206**. In some embodiments, downwardly extending portion **210** and upwardly extending portion **212** can be used to assist with keeping C-shaped connector **300** (discussed more in relation to FIGS. **4**-**5**) held within the interior volume **208** between web **202**, top flange **204** and bottom flange **206**.
[0076] In some embodiments, the top flange **204** and the bottom flange **206** can have a length of 1.5 inches. In some embodiments, the top flange **204** and the bottom flange **206** can have a length of anywhere between 1 inch and 2 inches. In some embodiments, the downwardly extending portion **210** and the upwardly extending portion **212** can have a length of ¾ of an inch. In some embodiments, the downwardly extending portion **210** and the upwardly extending portion **212** can have a length of anywhere between ½ an inch and 1 inch.
[0077] Engagement members **208** may be located anywhere along the length of channel form **200**.

In the illustrated embodiments, engagement member **208***a-d* are circular slots. In some embodiments, engagement members **208** can be square, rectangular, oval, or any other shape able to receive a fastener (not illustrated). Engagement members **208** can be of any size to appropriately receive a fastener. For example, engagement members **208** can have a diameter of approximately ¾ of an inch.

[0078] FIGS. **3**A-C show an additional example embodiment of channel form **200**. In the illustrated embodiment, channel form **200** is 48 inches (4 feet) in length. In said embodiment, channel form **200** has five engagement members **208***a-e* along top flange **204** and six engagement members **208***f-j* along bottom flange **206**.

[0079] In some embodiments, channel form **200** can include additional engagement members **208** along top flange **204** and bottom flange **206**. These additional engagement members **208** can be used to provide stability to the formwork. In particular, with longer length channel forms **200**, the additional engagement members **208** can receive a forming stake extending through an engagement member **208** within the top flange **204** through to an engagement member **208** within the bottom flange **206**.

[0080] In some examples, as an alternative to a forming stake, a bolt, a pin, a screw, or any other fastener could also be used.

[0081] In general, this fastener can provide an increased strength and ensure the channel form **200** is level along the ground when in use.

[0082] Referring now to FIGS. **4**, shown therein are multiple views of an example embodiment of connector **300**. Connector **300** is a C-shaped channel having a first end **320**, a second end **322**, web **302**, a top flange **304**, and a bottom flange **306**. In the illustrated embodiment, connector **300** has four engagement members **308***a-d* on the top flange **304** and four engagement member **308***e-h* on the bottom flange **306**. In some embodiments, top flange **304** and bottom flange **306** can each have two engagement members **308**.

[0083] Connector **300** is configured to be placed within interior volume **214** of channel forms **200**. Connector **300** has a height smaller than the channel form height **200** of approximately 5.5 inches. As such, connector **300** can have a height of anywhere between 3.5 inches and 11.7 inches. In the illustrated embodiment, connector **300** has a height of approximately 5.3 inches. Connector **300** can have a length of anywhere between 9 inches and 24 inches.

[0084] In the illustrated embodiments, top flange **304** and bottom flange **306** extend from web **302** in the same direction. Top flange **304** can further include a downwardly extending portion **310**, which is substantially parallel to web **302** and substantially perpendicular to top flange **304**. Bottom flange **306** can include an upwardly extending portion **312**, which is substantially parallel to web **302** and substantially perpendicular to bottom flange **306**.

[0085] Referring now to FIG. **5**, shown therein is an example embodiment of connector **300** in use. Connector **300** is illustrated to connect the second end **222** of first channel form **200***a* with first end **220** of second channel form **200***b*. Connector **300** can connect first channel form **200***a* and second channel form **200***b* to provide a completely flush web **202** surface. This can allow for the concrete, when poured within formwork system **100**, to have a completely flat edge without any imperfections where the channel form **200** pieces are connected and/or abutting.

[0086] First end **320** of connector **300** can be connected to second end **222** of first channel form **200***a* by engagement members **208** of first channel form **200***a* and engagement members **308** of connector **300**. In the illustrated embodiment, engagement members **208**, **308** of first channel form **200***a* and connector **300**, respectively, are aligned. This alignment can allow for a fastener (not illustrated), such as a stake, a pin, a bolt, a screw, or any other fastener, to extend through aligned engagement members **208**, **308** to secure the second end **222** of first channel form **200***a* to the first end **320** of connector **300**. In some embodiments, the fastener can be a ¾ inch forming stake to form a straight connection.

[0087] Second end **322** of connector **200** can then be connected to first end **220** of second channel

form **200***b* by the corresponding engagement members **208**, **308** of second channel form **200***b* and connector **300**.
[0088] In the illustrated embodiments, connector **300** has two engagement members **308** on the first end **320** and two engagement members **308** on the second end **322**, allowing for two secure points of connection between each channel form **200***a, b* and connector **300**. In some embodiments, additional engagement members **208**, **308** can be included on each channel forms **200***a, b* and on connector **300** to increase the connection between each piece. In some embodiments, fewer engagement members **208**, **308** can be included on each channel form **200***a, b* and on connector **300** to increase the speed of assembly and dis-assembly of formwork system **100**.
[0089] In the illustrated embodiment, engagement members **208**, **308** are each slots to allow for a fastener to be received within the engagement members **208**, **308** to connect the channel forms **200***a, b* and connector **300**. In some embodiments, engagement members **308** within connector **300** can be of a larger size than engagement members **208** of channel forms **200**. This can allow for increased accuracy of the spacing/abutting of channel forms **200** when assembling.
[0090] In other embodiments, engagement members **208**, **308** can be any other style to allow for engagement between channel forms **200***a, b* and connectors **300**. For example, in some embodiments, channel forms **200***a, b* can have a female connector component as an engagement member **208** and connectors **300** can have a male connector component as engagement member **308**, such as a hook and eye, a snap, a button, or any other type of engagement mechanism.
[0091] In some embodiments, once connector **300** is placed within the interior volume **214** of channel forms **200**, connector **300** can be manually moved within interior volume **214** to ensure correct alignment between connector **300** and channel forms **200**. This can allow for the user to adjust spacing between channel forms **200** to ensure a flush web **202** prior to the concrete being poured.
[0092] Referring now to FIGS. **6**A-B, shown therein are two perspective views of an example embodiment of angle connector **400**. FIG. **6**A illustrates an example embodiment of first arm **420** of angle connector **400**. As shown in FIG. **6**B, angle connector **400** can have a first arm **420** and a second arm **422** extending along separate axes, forming a connection between channel forms **200** to create a corner or an angular shape. Second arm **422** of angle connector **400** includes the same components as first arm **420**, and as such, all reference to first arm **420** in the following description could be referring to second arm **422**. First arm **420** of angle connector **400** is a C-shaped channel having a web **402**, a top flange **404**, and a bottom flange **406**. In the illustrated embodiment, first arm **420** of angle connector **400** has two engagement members **408***a-b* on the top flange **404** and two engagement member **408***c-d* on the bottom flange **406**. In some embodiments, top flange **404** and bottom flange **406** can each have more than two engagement members **408**.
[0093] Angle connector **400** is configured to be placed within interior volume **214** of channel forms **200**. Angle connector **400** has a height smaller than the channel form height **200** of approximately 5.5 inches. As such, angle connector **400** can have a height of anywhere between 3.5 inches and 11.7 inches. In the illustrated embodiment, angle connector **400** has a height of approximately 5.3 inches. In the illustrated embodiment, first arm **420** of angle connector **400** has a length of around 9 inches. In some embodiments, first arm **420** of angle connector **400** can have a length of anywhere between 9 inches and 12 inches.
[0094] In the illustrated embodiments, top flange **404** and bottom flange **406** extend from web **402** in the same direction. Top flange **404** can further include a downwardly extending portion **410**, which is substantially parallel to web **402** and substantially perpendicular to top flange **404**. Bottom flange **406** can include an upwardly extending portion **412**, which is substantially parallel to web **402** and substantially perpendicular to bottom flange **406**.
[0095] Engagement members **408** of each arm **420**, **422** of angle connector **400** can have the same shape, size, and configuration as engagement members **308** of connector **300**. In some embodiments, as illustrated, engagement members **408** are of an increased size in comparison to

engagement members **208** of channel forms **200** to allow for increased accuracy of abutment of channel forms **200** during assembly.
[0096] Angle connector **400** can include end connectors **424** to join first arm **420** and second arm **422**. In the illustrated embodiment, end connectors **424** are extensions from first arm **420** having connection point **426**. In the illustrated embodiment, first arm **420** has two end connectors **424**, one extending from top flange **404** and the second extending from bottom flange **406**. In some embodiments, end connectors **424** can be any size or shape to allow for connection between first arm **420** and second arm **422**.
[0097] For example, in some embodiments end connectors **424** can include welds, glue, snaps, buttons, hook and eye, or any other connection type.
[0098] End connectors **424** of first arm **420** and second arm **422** can be connected, in some embodiments, by a connection allowing rotation along a connector axis **430**. For example, a stake (not illustrated) can be placed through connection point **426** of both end connectors **424** of first arm **420** and through connection point **426** of both end connectors **424** of second arm **422**. The stake can allow first arm **420** and second arm **422** to be moveable relative to one another. This can allow for flexibility within the formwork systems **100**, such that all corners formed are not restricted to a specific degree based on the angle connector **400**. In some embodiments, the angle connector **400** can have a connector angle **432** (illustrated in FIGS. **7**B and **8**) of 90 degrees. In some embodiments, first arm **420** and second arm **422** can be moved such that angle connector **400** can have a connector angle **432** of anywhere between 15 degrees and 180 degrees. In some embodiments, connector angle **432** can be anywhere between 15 and 350 degrees. In some embodiments, the rotatable connection can be locked at the desired connector angle **432** to prevent movement of the first arm **420** and the second arm **422** of angle connector **400**.
[0099] In some embodiments, first arm **420** and second arm **422** of angle connector **400** are in a fixed position. In some embodiments, angle connector **400** has a connector angle **432** of 90 degrees.
[0100] Referring now to FIGS. **7**A-B, shown therein are multiple views of another example embodiment of angle connector **400**. In said embodiment, end connector **424** is of a different shape than illustrated in FIGS. **6**A-B. In the illustrated embodiment, end connector **424** can be used to provide a less variable connector angle **432** between first arm **420** and second arm **422**. This can provide for increased accuracy in measurement of connector angle **432**.
[0101] Referring now to FIG. **8**, shown therein is an example embodiment of angle connector **400** in use. Angle connector **400** is illustrated to connect the second end **222** of first channel form **200***a* with first end **220** of second channel form **200***b* to form a corner of the formwork system **100**. Angle connector **400** can connect first channel form **200***a* and second channel form **200***b* to provide a variety of corner angles.
[0102] First arm **420** of angle connector **400** can be connected to second end **222** of first channel form **200***a* by engagement members **208** of first channel form **200***a* and engagement members **408** of angle connector **400**. In the illustrated embodiment, engagement members **208**, **408** of first channel form **200***a* and angle connector **400**, respectively, are aligned. This alignment can allow for a fastener (not illustrated), such as a forming stake, a pin, a bolt, a screw, or any other fastener, to extend through aligned engagement members **208**, **408** to secure the second end **222** of first channel form **200***a* to the first arm **420** of angle connector **400**.
[0103] Second arm **422** of angle connector **400** can then be connected to first end **220** of second channel form **200***b* by the corresponding engagement members **208**, **408** of second channel form **200***b* and angle connector **400**.
[0104] In some embodiments, once angle connector **400** is placed within the interior volume **214** of channel forms **200**, angle connector **400** can be manually moved within interior volume **214** to ensure correct alignment between angle connector **400** and channel forms **200**. This can allow for the user to adjust the connector angle **432** between channel forms **200** to ensure the desired angle

has been achieved prior to pouring the concrete.
[0105] In an example embodiment, angle connector **400** can be used to connect channel forms **200** in different configurations. For example, when pouring the concrete pathway around a pool, two formwork systems **100** can be required. The first formwork system **100** can require a rectangular form with web **202** components of the channel forms **200** facing inwardly. The second formwork system **100** can require a smaller rectangular form with web **202** components of the channel forms **200** facing outwardly. This can form a pathway between each formwork system **100**. In said embodiment, angle connectors **400** can be required for each formwork system **100**. In the formwork system **100** with web **202** components facing inwardly, webs **402** of angle connectors **400** must also be facing inwardly, with the connector angle at 90 degrees. In the formwork system **100** with web **202** components facing outwardly, webs **402** of angle connectors **400** must also be facing outwardly, with the connector angle at 90 degrees. Angle connectors **400** can be adjustable to allow each angle connector **400** to rotate about connector axis **432** to achieve each required alignment.
[0106] In some embodiments, end connectors **424** can be separate from the arms **420**, **422** of angle connector **400**. In some embodiments, end connectors **424** can be attached to two connector **300** pieces to form angle connector **400**.
[0107] In some embodiments, all components of formwork system **100** can be manufactured from galvanized steel. In some embodiments, all components of formwork system **100** can be manufactured from galvannealed steel. In some embodiments, all components of formwork system **100** can be manufactured of any other type of metal.
[0108] Referring now to FIG. **9**, shown therein is an example embodiment of another formwork system **100**. In the illustrated embodiment, curved C-shaped channel form **500** is shown. Curved channel form **500** includes web **502** extending along the radius of curved channel form **500**. As illustrated, unlike channel forms **200**, curved channel form **500** includes only areas having an upper flange **504**, lower flange **506**, and engagement members **508**. Curved channel form **500** can have a first end **520** and a second end **522**. In the illustrated embodiment, at first end **520** and second end **522** of curved channel form **504**, the interior volume **512** between web **502**, upper flange **504** and lower flange **506** is included to allow for connectors **300** and/or angle connectors **400** to be introduced to connect curved channel form **500** to additional formwork components.
[0109] In some embodiments, as illustrated, the radius of curved channel form **500** includes several connection points **530**, each having a top flange **504**, a bottom flange **506**, and an engagement member **508**. As with channel form **200**, these engagement members **508** can be used to provide stability to the formwork. In particular, with longer radius curved channel forms **500**, the additional engagement members **508** can receive a forming stake, a bolt, a pin, a screw, or any other fastener extending through an engagement member **508** within the top flange **504** through to an engagement member **508** within the bottom flange **506**. In said embodiment, this fastener can provide an increased strength and ensure the curved channel form **500** is level along the ground when in use.
[0110] In some embodiments, the radius of the curved channel forms **500** is 2 feet. In some embodiments, the radius of the curved channel forms **500** is 4 feet. In some embodiments, the radius of the curved channel forms **500** is 8 feet.
[0111] In some embodiments, the curved channel forms **500** can be connected by connectors **300** to form firepits. In some embodiments, the curved channel forms **500** can be connected to channel forms **200** by connectors **300** to create a curved edge to a sidewalk, for example. In some embodiments, the curved channel forms **500** can be connected together or to channel forms **200** by angle connectors **400**.
[0112] Referring now to FIGS. **1** to **9** when being assembled, channel forms **200**, connectors **300** and angle connectors **400** are able to connect in multiple variations to create a formwork system **100**.
[0113] At a first step, the first end **320** of connector **300** is placed within the interior volume **214** of

the second end **222** of a first channel form **200**. In some embodiments, the first arm **420** of the angle connector **400** can be placed within the interior volume **214** of the second end **222** of the first channel form **200**.
[0114] At a second step, the second end **322** of connector **300** is placed within the interior volume **214** of the first end **220** of a second channel form **200**. In some embodiments, the second arm **422** of the angle connector **400** can be placed within the interior volume **214** of the first end **220** of the second channel form **200**.
[0115] At a third step, engagement members **208** of channel forms **200** are aligned with engagement members **308** of the connector **300**. In some embodiments, engagement members **208** of channel forms **200** are aligned with engagement members **408** of the angle connector **400**.
[0116] At a fourth step, the first and second channel forms **200** are secured to the connector **300** by the respective engagement members **208**, **308**. In some embodiments, the first and second channel forms **200** are secured to the angle connector **400** by the respective engagement members **208**, **408**.
[0117] In some embodiments, steps one through four can be repeated with additional channel forms **200**, curved channel forms **500**, connectors **300** and angle connectors **400** in any variation desired by the user to create a requested shape and/or form.
[0118] In some embodiments, step four further includes securing the channel forms **200** to the connector **300** or the angle connector **400** using a screw, a pin, or a bolt.
[0119] In some embodiments, after the desired shape and/or form has been created by the user, a concrete material can be poured within the formwork. In some embodiments, the concrete material can be left within the formwork to cure and form a concrete slab. In some embodiments, once the concrete material has formed the concrete slab, the formwork system **100** can be disassembled by the user by removing any fasteners within engagement members **208**, **308**, **408** and disconnecting channel forms **200** from connectors **300** and/or angle connectors **400**. Once formwork system **100** has been fully disassembled, all components (channel forms **200**, connectors **300**, angle connectors **400**, curved channel forms **500**) can be re-used to construct additional formwork systems **100** having different configurations or shapes.
[0120] The above noted invention provides a user with a formwork system **100** that requires minimal time to set up and uses minimal tools and/or parts to assemble. Further, the connecting channel forms **200** in some cases may provide no overlap when connected using connectors **300**, providing a smooth edge for the concrete once it has been poured and set.
[0121] Turning now to FIGS. **10**A to **10**C, illustrated therein is an angle connector **600** according to another embodiment. In particular, FIG. **10**A is a perspective view of the angle connector **600** that is capable of having a variable angle. The connector **600** includes a first angle member **602** that is movably coupled to a second angle member **604** via a flexible connector, such as a pin connector **606**. As will be appreciated, the angle members **602**, **604** can be pivoted with respect to each other about the pin connector **606** so as to adopt a desired angle. In this manner, angles other than 90 degrees can be achieved, such as acute angles (i.e., 30 degrees, 45 degrees, etc.), and obtuse angles (i.e., 135 degrees).
[0122] FIG. **10**B is an overhead view of the angle connector **600**, while FIG. **10**C is an elevation view of the angle connector **600**.
[0123] Turning now to FIG. **11**, illustrated therein is a perspective view of a connector **650** according to one embodiment. In some embodiments, for example, the connector **650** may be suitable for use with flexible forms, such as the flex form **800** shown in FIG. **14**A and FIG. **14**B. As shown, holes **652** in the connector **652** may be use to connect to corresponding holes (i.e., holes **802**) in a flexible form, such as via a pin connector, bolt, and the like.
[0124] Turning now to FIGS. **12**A and **12** B, illustrated therein is a notched filler member **700** according to one embodiment. In particular, FIG. **12**A shows a perspective of view of the notched filler member **700**, while FIG. **12**B is an elevation view of the notched filler member **700**. As more clearly shown in FIG. **12**B, the member **700** may include a plurality of notches **702** in the webs of

the member **700**. In some cases, these notches **702** may improve the flexibility of the member **700**. In some cases, these notches may allow for one or more segments of the member **700** to be broken or snapped off.
[0125] For example, in some cases the member **700** may be easily snapped off at the location of a particular notch **702**. This may be useful for resizing the length of the member **700**.
[0126] Turning now to FIG. **13**, illustrated therein is a perspective view of an angle connector **750** according to another embodiment. In general, the connector **752** includes a first angle member **752** and a second angle member **754** that are fixedly connected at a particular angle **756** (in this example the angle **756** is approximately 90 degrees). In other cases, the angle **756** may have different values.
[0127] In some cases, the first and second angle members **752**, **754** may have different sizes and lengths, and which may be the same and/or different. In some cases the first and second angle members **752**, **754** may have a length of approximately 12 inches.
[0128] Turning now to FIGS. **14**A and **14**B, illustrated therein is a flexible form **800** according to one embodiment. As shown, the flexible form **800** includes a plurality of notches **802** (or slits) that allow the form **800** to be flexible and bend into different shapes (i.e., a “C” curve, an “S” curve, and so on). In some cases, as best shown in FIG. **14**B, the form **800** may include one or more holes **804** to be connected with other members (for example using connector **650**).
[0129] Turning now to FIG. **15**, illustrated therein is a perspective view of a straight beam **850** according to another embodiment. The beam **850** may have various shapes and sizes as needed. For example, the beam **850** could be 8 inches high and 48 inches long in one embodiment.
[0130] In some cases, the teachings herein can increase the longevity of the products, as well as the speed at which the components can be assembled, particularly when compared with other formwork solutions. This can decrease labor costs and may provide other efficiencies that are generally desirable
[0131] While the applicant's teachings described herein are in conjunction with various embodiments for illustrative purposes, it is not intended that the applicant's teachings be limited to such embodiments as the embodiments described herein are intended to be examples. On the contrary, the applicant's teachings described and illustrated herein encompass various alternatives, modifications, and equivalents, without departing from the embodiments described herein, the general scope of which is defined in the appended claims.

Claims

1. A formwork system comprising: at least two C-shaped channel forms each having a first end and a second end, each C-shaped channel form comprising a web, a top flange, and a bottom flange, wherein the top flange and the bottom flange are separated by a channel distance; a C-shaped connector for connecting the second end of a first C-shaped channel form to the first end of a second C-shaped channel form, the C-shaped connector comprising a web, a top flange and a bottom flange, wherein the top flange and the bottom flange are separated by a connector distance; wherein the connector distance is smaller than the channel distance.
2. The formwork system of claim 1, wherein the top flange and the bottom flange of each of the C-shaped channel forms and the C-shaped connector comprise at least one engagement member for aligning the C-shaped connector with at least one of the C-shaped channel forms.
3. The formwork system of claim 2, wherein the at least one engagement member comprises alignment slots for aligning the C-shaped connector with at least one of the C-shaped channel forms, the alignment slots for receiving at least one forming stake, bolt, screw, stake or pin.
4. The formwork system of claim 1, the C-shaped connector is an angle C-shaped connector having a first arm extending along a first axis and a second arm extending along a second axis, the first arm for connecting to the second end of the first C-shaped channel form and the second arm for

connecting to the first end of the second C-shaped channel form.
5. The formwork system of claim 4, wherein the angle C-shaped connector is at a 90 degree angle.
6. The formwork system of claim 1, wherein the C-shaped channel forms and the C-shaped connectors are formed of galvanized steel.
7. The formwork system of claim 1, wherein the C-shaped channel forms and the C-shaped connectors are formed of galvannealed steel.
8. The formwork system of claim 1, wherein the C-shaped channel forms are of a length anywhere between 12 inches and 120 inches.
9. The formwork system of claim 1, wherein the C-shaped channel forms are curved.
10. The formwork system of claim 1, wherein when the second end of the first C-shaped channel form is connected to the first end of the second C-shaped channel form, the second end of the first C-shaped channel form and the first end of the second C-shaped channel form align to create a smooth surface.
11. A kit for assembling a formwork system, the kit comprising: at least one C-shaped channel form as described in claim 1; at least one C-shaped connector as described in claim 1; and at least one angle C-shaped connector as described in claim 4.
12. The kit of claim 11, further comprising four angle C-shaped connectors, at least 12 C-shaped channel forms, and at least 10 C-shaped connectors.
13. The kit of claim 11, further comprising stakes, pins, screws or bolts for receiving within the C-shaped channel forms and C-shaped connectors.
14. A method of assembling a formwork system comprising: a) inserting a first end of a C-shaped connector within a first C-shaped channel form, b) inserting a second end of the C-shaped connector within a second C-shaped channel form; c) aligning at least one engagement member of the C-shaped channel forms and at least one engagement member of the C-shaped connector; d) securing the first and second C-shaped channel forms to the C-shaped connector using the respective engagement members.
15. The method of claim 14, further comprising repeating steps (a) through (d) with additional C-shaped connectors and C-shaped channel forms to create a desired shape.
16. The method of claim 14, wherein the C-shaped connector is an angle C-shaped connector having a first arm extending along a first axis and a second arm extending along a second axis, the first arm for connecting to the second end of the first C-shaped channel form and the second arm for connecting to the first end of the second C-shaped channel form.
17. The method of claim 14, wherein the C-shaped connectors and the C-shaped channel forms each comprise a web, a top flange, and a bottom flange, the top flange and the bottom flange each comprising at least one engagement member for aligning the C-shaped connector with at least one of the C-shaped channel forms.
18. The method of claim 14, wherein step (d) further comprises securing the C-shaped channel forms with the C-shaped connector with a stake, a screw, a pin, or a bolt.
19. The method of claim 14, further comprising (e) pouring a concrete material within the formwork, wherein the concrete material forms into a concrete slab.
20. The method of claim 19, further comprising (f) removing the C-shaped channel forms and the C-shaped connector from the concrete slab for re-assembly.