ABSTRACT

One embodiment of the invention is a horizontal scaffold truss that has upper and lower horizontal scaffold members offset but fixedly joined with braces. Each upper and lower members have a connector positioned on each end of the respective lower and upper members, where at least one of the connectors is pivotally mounted on the respective lower or upper connector, and the connectors are engageable with an annular member positioned on a vertical scaffold member.
PIVOTING HORIZONTAL AND VERTICAL SCAFFOLD MEMBERS AND A METHOD OF ERECTING AN OFFSET SCAFFOLD PLATFORM


[0002] All patents and patent applications referenced herein are incorporated by reference.

BACKGROUND

[0003] Scaffold frames are a series of horizontal and vertical scaffold frame members that connect together to create a raised working platform. The overall structure is supported by the vertical scaffold members contacting the support surface, such as the ground.

[0004] Scaffold frames can be constructed from tube and clamp frame members, or from system scaffold members (modular scaffold systems). In system scaffolds, the vertical scaffold members are coupled to horizontal scaffold members at a scaffold joint. A modular scaffold joint comprises a connector on the vertical scaffold member that is designed to couple or mate with a connector on a horizontal scaffold member, thereby joining together a horizontal and vertical scaffold member. Horizontal scaffold members will be referred to in general as “horizontals”, while vertical scaffold members will be referred to generally as “verticals” irrespective of the joint/connector type.

[0005] One type of modular scaffold joint uses an end connector positioned on the end of a horizontal member, where the end connector has a lip or hook section. The lip sections are designed to engage or rest on the corresponding vertical joint connector, such as an upstanding cup or an annular ring positioned on a vertical scaffold member. One such joint is disclosed in U.S. Pat. No. 4,445,307, which discloses a connector positioned on a horizontal scaffold member, where the connector has two vertically spaced hook sections. These hook sections couple with two vertically spaced upstanding cup or ring members located on the vertical scaffold member. To lock the joint in place, the connector includes a wedge that is driven (generally by a hammer) into position below the upper ring member, thereby wedging the ring against the end connector hook section, latching the horizontal member to the vertical member. This type of connector is referred to as a Safway connector (see attached FIG. C). As used herein, “latching” refers to the action of engaging a horizontal member to a vertical member, where the action of latching resists dislodgement of the horizontal member from the vertical member from an upwardly directed force.

[0006] Another cup type of latching connector is disclosed in U.S. Pat. Nos. 5,078,532 and 5,028,164 and in U.S. application Ser. No. 12/489,166 all hereby incorporated by reference. These patents also show an end connector positioned on a horizontal scaffold member, where the connector has two vertically spaced hooked sections that couple with two vertically spaced upstanding cup or ring members located on the vertical scaffold member. In this device, the hooked sections engage the top edge of the cup, and a pivoting member or latch, positioned on the horizontal end connector, is pivoted into position below the cup member. The latch member has a distal end extending beyond the housing, shaped to allow for placement of the distal end beneath a cup positioned on a vertical scaffold member. Hence, when latched, the cup is trapped between the hook engagement sections of the connector housing and the distal end of the latch member. The latch pivots on a pivot pin, and can be spring loaded to bias the latch into a locking or actuated position. This type of connector is referred to as an Excel lock (see attached FIG. D). Single cup embodiments are also possible, such as shown in U.S. Pat. No. 7,048,093. Other cup type latching mechanisms are in the prior art, including U.S. Pat. No. 4,369,859.

[0007] Another “cup” type of latching mechanism is disclosed in U.S. application Ser. No. 11/738,273, filed Apr. 20, 2007 (hereby incorporated by reference). This application teaches a horizontal scaffold member having an end connector with two hook or engagement areas, each designed to couple with a cup on a vertical member. The connector includes an upper and a lower latch, each the respective upper and lower coupled ring or cup members. The two latches are mechanically coupled allowing for single action operation to engage or disengage both latches simultaneously. In general, a scaffold system using a cup on the vertical member with a latch on the horizontal scaffold member (whether slideable or pivotable) will be referred to as a cup/latch scaffold system. This is also in the scope of an Excel connector.

[0008] Another cup-type of latching connector is disclosed in U.S. Pat. No. 3,992,118 (commonly referred to as the Cuplock system). As disclosed in this patent (see particularly FIGS. 3 and 4 of this patent), the vertical scaffold member (generally a pipe) has a fixed annular ring forming an upstanding cup surrounding the vertical member with upward facing annular channel. Positioned above this upstanding cup at a set height is a lug. Slidably and rotationally positioned on the vertical scaffold member above this fixed cup, is a reverse cup (a cup facing downwardly) that has a downward facing annular channel, and an outward projection in the cup wall that forms a slot. This slot accommodates the lug, so that when the reverse cup, with the slot aligned with the lug, can slide past the lug, and if the slot is not aligned with the lug, the reverse cup cannot slide past the lug. The corresponding horizontal scaffold member (generally a pipe) has at each end, an upward facing ear or tongue and a downward facing ear or tongue. Each respective tongue is shaped to fit in the annular channel formed in the respective upward and reverse cup. To assemble a joint, the downward tongue on the horizontal member is positioned in the upward annular channel of the upstanding cup. The reverse cup is then slid down the vertical member, past the lug, by proper alignment of the slot, to capture the upstanding tongue within the downward facing annular on the reverse cup. The reverse cup is then rotated on the vertical horizontal member until the slot is not aligned with the lug, thereby “locking” the tongues of the horizontal between the upstanding cup, and the reverse cup (hence the name cuplock). (See attached FIG. B).

[0009] Instead of upstanding cups, a flat annular ring with openings in the ring may be used as the vertical connector on the vertical scaffold member, to couple to a connector on a horizontal scaffold member. Examples of annular ring connector systems are shown in U.S. Pat. Nos. 4,273,463; 6,027,276; 5,961,240; 5,605,204; 4,840,513; and PCT publication number WO 2011/094351. All of which are hereby incorporated by reference. These systems are generally referred to as wedge or pinlock scaffold systems. The pinlock system relies upon a wedge or pin being slideable (generally hammer driven) through the horizontal end connector and rosette. For instance, the joint of U.S. Pat. No. 5,961,240 (see FIG. 1 of
that patent, attached as FIG. A hereto), uses rosette rings 16
positioned on a vertical scaffold member. The ring 16 has
a series of openings 22 therethrough. The horizontal end
connector 10 is a body with a horizontal slot or mouth 18
in the body to accommodate the rosette ring. Slidably positioned
on the horizontal end connector is a pin 20, which is vertically
slidable through a vertical slot 44 and 38 in the connector
body. In joining a vertical member to a horizontal member,
the rosette 16 is slid into the mouth 18 of the horizontal
connector, with an opening 22 in the rosette aligned with the
vertical slot 44 and 38 in the end connector. The pin 20 is
then rotated upwardly, and then through the vertical slots 44
and 38, which wedges and holds the horizontal member to
the vertical member.

[0010] System scaffolds are used to allow for ease of ercc-
tion of scaffold platforms. However, in some instances, it is
not possible to erect a horizontal scaffold platform where
the horizontal scaffold members are supported on four (or more)
corners by downwardly extending ground supported vertical
scaffold members. For instance, an elevated working surface
may be needed that is connected to a self-standing scaffold
structure, but where the platform is offset or cantilevered
from the scaffold frame structure in order to extend the work-
ing platform over a structure (such as a tank). An offset
working surface may be created by using a triangular shaped
frame member connected to the scaffold frame structure (gen-
erally, two vertical members of the frame) to create an offset
“knee out” structure that will support a cantilevered horizon-
tal working surface. One such structure is shown in U.S.
application Ser. No. 12/824,314 filed on Jun. 28, 2010, hereby
incorporated by reference. However, when the offset working
surface needs to extend more than about ten feet from the
scaffold frame, a knee out support structure may not be fea-
sible.

[0011] If the working environment includes overhead
structures (often seen in bridge and offshore platforms), off-
set scaffold working surfaces with long platforms can be
constructed by suspending the remote end (or intermediate
portion) of the offset extended platform from the overhead
structure. The suspended offset scaffold working surface
makes long extended platforms feasible, but construction is
arduous and dangerous. One method of erecting such an
offset and suspended platform is as follows. A self standing
scaffold structure is constructed adjacent to the overhead
structure, with a working surface positioned at the desired
height for the offset platform. From this working surface,
a worker will couple an outwardly extending horizontal mem-
ber to one of the vertical legs of the scaffold, to form an
outwardly extending horizontal member supported only at
one end by the couple to the vertical scaffold member. Place-
ment of the extended horizontal, for instance, an eight foot
long horizontal member, is awkward due to the weight of the
horizontal member, and the fact that the horizontal member
must be held in position perpendicular to the vertical member
in order to couple to the vertical member, thus presenting
large torque forces during installation. With a horizontal
extending outwardly, a worker would tie off to the scaffold
structure, and walk out on the extended horizontal (which
is coupled to the scaffold frame at only one end). The worker
would then connect a vertical to the free end of the horizontal,
and then support the vertical from the overhead structure
(such as by tying a rope or chain between the overhead struc-
ture and the vertical). The worker would return to the plat-
form, and install a second outwardly extending horizontal,
and similarly, attach a vertical to the remote end of this hori-
zontal, and suspend this vertical from the overhead structure.
Scaffold planks are then laid over the two suspended hori-
zontals, creating a deck or working surface. A worker would then
take a third horizontal, and connect the two suspended verti-
cals to form a more rigid support frame for the working
surface. Handrails can then be installed as desired between
the verticals of the scaffold main frame and the suspended
verticals.

[0012] As can be seen, this erection method requires a rigid
joint between the horizontal and vertical scaffold member to
allow a worker to safely walk out on an extended horizontal.
For this reason, the preferred joint for this structure is the
pinlock system, such as shown in U.S. Pat. No. 5,961,240,
as a tight joint is needed to support a worker while working
out on the extended horizontal. During the construction,
the worker will generally be tied off to the overhead structure.
However, even tied off, the procedure is dangerous and awk-
ward. To join a horizontal to a vertical, the horizontal member
must be held at a right angle to the vertical to allow the
horizontal connector to couple to the vertical rosette or cup.
This is difficult to accomplish due to the weight of the hori-
zontal, and the length of the horizontal (7-10) feet. A safer
apparatus and method of assembly is needed for building
offset suspended scaffold decks.

[0013] Collectively, cups and rosettes, or other types of
annular members on the vertical scaffold member used to
couple to a horizontal end connector will be referred to col-
lectively as annular members.

BRIEF DESCRIPTION OF THE DRAWINGS

[0014] FIG. 1 is a side elevation of one embodiment of a
horizontal truss with a vertically pivoting pinlock connector.

[0015] FIG. 2 is a side elevation of one embodiment of a
horizontal truss with a vertically pivoting cup/latch connec-
tor.

[0016] FIG. 2 Detail is a side elevation partial view of truss
end of FIG. 2.

[0017] FIG. 3 is a side elevation of one embodiment of a
horizontal truss with horizontally pivoting pinlock connec-
tors.

[0018] FIG. 4 is a side elevation of one embodiment of a
horizontal truss with horizontally pivoting cup/latch connec-
tors.

[0019] FIG. 5 shows one embodiment of a bracket used to
mount a connector for pivoting.

[0020] FIG. 6 is a side elevation of one embodiment of a
pivoting horizontal truss with a cup/slidable latch connector.

[0021] FIG. 6 Detail is a detailed view of end connector
91A on the truss embodiment of FIG. 6.

[0022] FIG. 7 is a side elevation of one embodiment of a
pivoting horizontal truss with a cup and cup lock connector.

[0023] FIG. 7 Detail is a detailed view of end connector
91A on the truss embodiment of FIG. 7.

[0024] FIG. 8 is a side view of one embodiment of the truss
having both horizontal and vertical pivotable connectors.

[0025] FIG. A is a perspective view of one embodiment of a
pin lock type scaffold joint (taken from FIG. 1 of U.S. Pat.
No. 5,961,240).

[0026] FIG. B is a perspective views of one embodiment of a
cup lock type scaffold joint (taken from FIGS. 3, 4, and 5 of
U.S. Pat. No. 3,992,118).
FIG. C is a perspective views of one embodiment of a Safway type scaffold joint (taken from FIGS. 1, 2, 9 and 10 of U.S. Pat. No. 4,445,307).

FIG. D is a perspective views of one embodiment of an Excel type scaffold joint (taken from FIGS. 1 and 2 of U.S. Pat. No. 5,678,532).

DESCRIPTION OF THE PREFERRED EMBODIMENT

Shown in FIG. 1 is a horizontal scaffold truss member 1. The truss member 1 has two parallel horizontal pipes, and upper pipe 10 and lower pipe 20, and support elements or bracing members 30 positioned between the two horizontal pipes. Preferably, at each end of the horizontal pipe 10 and 20 are end connectors 90A, 90B, 90C and 90D (90A and 90C forming upper connectors on upper horizontal 10, and 90B and 90D forming lower connectors on lower horizontal 20). For convenience of description, the end connectors 90 shown are similar to those shown in U.S. Pat. No. 5,961,240, but the invention is not so limited. The “vertical” separation between the two horizontal pipes 10 and 20 is such so each end connector will mate with a corresponding annular member or connector 80 (here a rosette) on the vertical member 100, as shown in FIG. 1.

As shown, three of the end connectors 90B, 90C, and 90D, are fixedly joined to the respective end of the horizontal pipe. However, one upper end connector, 90A, is pivotally coupled to the end of the upper horizontal pipe 10. As shown in FIG. 1, upper end connector 90A allows the upper horizontal pipe 10 to pivot in a vertical plane with respect to the end connector 90A, about pivot pin 60, allowing the truss member 1, when connector 90A is coupled to the corresponding vertical, to swing in a vertical plane, much like a drawbridge (as used, “vertical” is in a plane that passes through and substantially parallels the vertical scaffold member to which the truss is to be joined or the plane that passes through the parallel upper and lower members of the truss, while “horizontal” pivot implies pivoting in a plane substantially perpendicular to that plane containing the upper and lower members). Hence, vertical pivoting implies that the truss members distend end pivots toward or away from the ground, pivoting much like a vertically pivoting railroad crossing guard (e.g. a drawbridge type of action), while horizontal pivoting implies that the truss member swings outwardly from the vertical to which it is attached (much like a swinging hinged gate) without substantially changing its height (e.g. pivoting in a plane parallel to the ground).

To accomplish horizontal pivoting, the horizontal connector body 90A (not shown in FIG. 5) is generally fixedly mounted on a U shaped body 300 having ears 301, shown in FIG. 5. The body 300 then pivots with respect to the horizontal pipe 10 (the horizontal member is positioned interior or between the extending ears 301), by pivoting about a first pivot pin mounted through ears 301 and horizontal upper pipe 10. A second pin may be inserted through the pipe 10 and ears to lock the connector in a non-pivoting configuration about the horizontal pipe 10. Other means of allowing the connector to pivot with respect to the pipe could be used, as well as other locking means. For instance, for a horizontal pivoting connector, the connector may be mounted to the exterior (or interior) of the pipe using a bearing. Alternatively, the connector 300 may have a lower ear (not shown) used as a stop which would prevent the pipe from vertically pivoting past the projecting ear. The selected horizontal system horizontal end connect (not shown in FIG. 5) is mounted to (or integral with) the connector body 300.

This truss member 1 will be used to form one side of the extended offset platform as follows. A worker, working from the existing scaffold supported platform, such as from a horizontal scaffold deck, will tie a rope to the truss, and suspend the truss upright from the established scaffold structure, or from an overhead structure (such as a bridge member), where the suspended truss upper horizontal 10 is positioned adjacent to the vertical scaffold member to which it is to be coupled, with the couple 90A positioned adjacent to the corresponding joint on the vertical member (here a rosette). The truss member 1 will generally be supported or suspend “above” the corresponding couple rosette point on the vertical that will couple with joint 90A on the suspended truss. The worker will then adjust the rope until the pivoting end of couple 90A on the top horizontal scaffold member 10 is directly adjacent to and insertable into the proper rosette. Preferably, a second worker will then couple the horizontal connector 90A to the vertical connector (e.g. position the mouth of the horizontal connector body over the rosette by pivoting connector body 300 so that it is at substantially a right angle to the suspended upright horizontal member 10) and then lock the connector in place (drive in the pin through the connector and rosette opening). The first worker then lowers the rope, which results in the downward pivoting of the truss member about the coupled and locked joint 90A, in a vertical plane, until the lower connector body 90B is adjacent to the corresponding rosette on the vertical member. Preferably, the second worker then connects connector 90B with the proper rosette and locks the connector in place. One of the workers may slide the locking pin into the aligned opening in the ears of the upper bracket 300 as a safety measure (not required) to resist further rotation of the truss.

This procedure is repeated on an adjacent vertical of the existing scaffold structure, creating two truss members that are outwardly extending from the adjacent scaffold platform, each supported on one end only. At this point, the worker places scaffold planks between the two extended trusses, forming a working platform deck. In one embodiment of a scaffold plank, each end has downwardly extending U shaped brackets to couple the plank to the respective horizontal (where the horizontal is a circular pipe member). As each plank is about nine inches-a foot wide, multiple planks are slid out over the extended truss members. A worker will then move out on the new deck or platform, carrying a vertical scaffold member. The worker will then attach the vertical to the connectors 90C and 90D, and support the attachment to the overhead structure. Preferably, the overhead structure will have a component (such as a first beam) in a vertical plane that passes close to the vertical member to be suspended or the center of the resulting suspended platform (if the beam is substantially off “alignment” with the vertical to be supported, directly supporting the vertical to such a non-aligned overhead beam will not only provide an upward supporting force, but will also provide a horizontal force component, and a large horizontal force component is not preferred). For instance, a chain can be attached (such as looped around the overhead structure) to the overhead structure and tied to an eyebolt fixed or formed at the top of the vertical. A come-along can be used to shorten (or lengthen) the chain to position the truss member in a level position. A second vertical is coupled to the other truss member connectors 90C and 90D, and similarly supported by or suspended from the overhead...
structure (again, preferably, the overhead structure includes a second component, such as a beam, in a vertical that passes through or close to the center of the extended platform) and then modify the chain length to level the truss, thereby leveling the resulting platform. Horizontals can then be positioned between the two suspended verticals at the rosettes between corresponding 90D joins and 90C joins, to form a three sided suspended frame for the deck or offset working surface. The fourth side of the frame is formed by the ground supported prior existing scaffold frame structure. A single horizontal member may be used to join the two suspended verticals, such as at the level of the upper pipes 10, or the lower pipes 20, or two horizontal members used, one between the upper members, and one between the lower members of the opposing trusses. Additional horizontals may be joined between the suspended verticals, and between the suspended verticals and verticals of the existing scaffold structure, as needed, at a height above the installed deck for a safety rail.

When the truss is initially installed and supported only on one end to a single vertical, the truss is supported on that vertical at two spaced apart locations—the upper joint 90A connection and the lower joint 90B connection to the vertical. This double connection creates a strong, stable joint. Additionally, because the truss itself forms a rigid structure, the single extended truss is more stable than a single extended horizontal. Although the truss member is heavier than a single horizontal, the pivoting joint allows the worker to install the truss vertically, reducing the torque forces that would be present in attempting to tie in the truss, or even a single horizontal at ninety degrees to a vertical (as the truss is supported as it is pivoted downward). A grab bar or handle may be included on the truss member to assist in operator manipulation of the truss during installation. Although the invention is described as a pivoting joint on a truss member, a pivoting connector may also be on a horizontal scaffold member, as opposed to a truss member. While installation is eased with a pivoting horizontal joint, the single horizontal is not as rigid as a truss, and hence is not preferred, but is within the scope of the invention.

As described, the pivoting joint connector is located on the top horizontal of the truss member. As an alternative, the pivoting joint member may be positioned on the bottom horizontal (e.g. joint 90B), but this is not preferred. With a bottom pivoting joint, during installation, the vertically supported upright truss is positioned so the top of the upright truss is positioned adjacent the lower connector on the vertical, with the lower horizontal 20 immediately adjacent the vertical scaffold member. However, in this configuration, the vertically suspended truss 1 is generally suspended below the rosette or annular member that will couple with joint 90B, and hence the suspended truss, once the couple with 90B is established, must now be rotated or pivoted “upwardly” to allow the connector 90A on the top horizontal 10 to come into alignment with the upper connector on the vertical member (as opposed to “lowering” the vertically suspended truss from a pivoting connector on the top horizontal). This raising movement is considered more arduous, and hence, the pivoting bottom connector 90B is not preferred.

A second vertically pivoting truss is shown in FIG. 2, however, shown in this truss member is a pivoting join on the horizontal that is of the cup/lambda type of joint. In the embodiment shown in FIG. 2, the truss contains only three connectors, pivoting connector 91A, and non-pivoting connectors 91C and 91D. Shown attached to the lower truss member at location 91B is an arcuate shaped body 95, a couple member, shaped to mimic the outer curvature or shape of the vertical scaffold pipe. “Arcuate” will be used to indicate that couple member’s shape is comparable to that of the vertical for support by that vertical (for instance, if the vertical is square, “arcuate” indicates the couple member is shaped to rest on the vertical — i.e. forms three sides of a square). With a annular cup 81 engagement (as opposed to the flat annular rosette), a connector positioned on the lower truss member cannot properly engage the cup 81 by pivoting into place, as the front of the hook type connector, in a pivot action, would contact the exterior surface of the cup 81. Hence, the couple member is designed to engage and support the truss against the vertical scaffold member without using a connector to connect to a cup. The couple member 95 is preferably shaped to rest on a vertical member and help support the truss member. Couple member could also be a clump positioned around the vertical and joined to the lower horizontal, such as a pivoting clamp. Couple member may also be two parallel opposing plates so that when the truss is installed, the vertical member is trapped between the two parallel plates (not shown). Alternatively, but not preferred, both ends of the lower horizontal could terminate in a couple member, such as an arcuate shaped coupled member, a clamp, etc.

If two cup type connectors are desired to attached to spaced apart cups, a horizontally pivoting embodiment may be used (as later described), or the bottom connector at position 91B should be slideable vertically with respect to the horizontal member 20, so that the lower connector 91B can be moved vertically upwardly, to clear the cup, then downwardly to engage the cup; alternatively, in some connector embodiments, instead of sliding vertically, the second end connector on lower horizontal may be rotatable about an axis aligned with the center of the horizontal member, thereby allowing the second end connector to be positioned adjacent the corresponding cup or rosette or other connector on the vertical, and rotated into proper coupling orientation (not shown). The horizontal position of such a rotatable or vertically slideable horizontal end connector preferably is lockable, such as with a pin, to prevent unwanted movement after engagement with the respective cup or rosette.

The truss member 1 is used to assemble an extended, vertically supported platform as the previous connector. Once one suspended offset platform is in place, this offset platform may now be used as the “fixed” scaffold, and another extended offset platform may now be attached, using a similar construction technique. For instance, if 30 x 10 foot extended platform is needed, the first ten foot extended offset platform is erected as an outwardly extending platform from the fixed scaffold structure to create a 10 x 10 offset platform. After this extension has been vertically supported, a second offset ten foot platform is built connected to the first offset platform at overhead supported end, thereby creating a 10 x 30 foot vertically supported offset platform, and so on (the suspended platform may also be 20 x 20, having three parallel trusses each 10 feet across, etc.). Breakdown or disassembly of the platform is performed in substantially the reverse order as assembly.

A third type of pivoting truss member is shown in 3. Shown here is a truss member 1 having pivoting connectors 90AH and 90BH. However, these connectors are designed to pivot in the horizontal plane (like a swinging fence gate), where “horizontal plane” is a plane ninety degrees to the orientation of a vertical member (e.g. parallel to the ground).
Again, the preferred construction is to have the horizontal members 10 and 20 attached to a U shaped bracket 300, and the bracket 300 pivots with respect to the horizontal members 10 and 20. In this instance, the ears 301 of the bracket 300 are positioned on “top” and “bottom” of the horizontal members 10 and 20 to provide for horizontal pivoting (whereas the vertically pivoting truss has the ears mounted on the “sides” of the horizontal members).

To build an offset vertically supported platform with this truss, the truss is installed in its natural orientation, horizontally. To avoid torque forces, the truss should be horizontal but not extending outwardly from the scaffold frame. Instead, the truss should be oriented so that it is adjacent the side of the scaffold platform. In this orientation, a worker can support the truss with almost no torque forces, if supported from the center of the truss (overhead support is not necessary). To attach, one worker supports the truss and connectors 90AH and 90BH are pivoted to face the respective annular members 80 for engagement and mounting. One worker holds the truss, while a second worker aligns the two truss connectors 90AH and 90BH with the respective connectors 80 on the vertical scaffold member, and joins the truss connectors to the vertical connectors and locks the connectors in place. The second horizontally pivoting truss is similarly installed on an adjacent vertical. The installed trusses are rotated horizontally (swung outwardly) until they extend outwardly and generally are perpendicular to the scaffold frame. As in the other methods, decking is laid, verticals are attached to the remote ends of the truss, and the verticals supported from an overhead structure. A similar horizontally pivoting truss in a cup/latch embodiment is shown in FIG. 4.

Another horizontally pivoting truss embodiment is shown in FIG. 6, using end connectors similar to that shown in U.S. Pat. No. 4,445,307. In this embodiment, the latch or lock member does not pivot with respect to the end connector, but is slidable with respect to the end connector (such as a wedge 102 that is slid into position underneath the respective cup in an assembled scaffold joint). In the truss shown in FIG. 6, the two horizontal members 10 and 20 each have horizontally pivoting end connectors 91A and 91B. Pivoting end connectors are not required on the other end of the truss member. This truss is installed similarly to the truss described in FIG. 3. This end connector type may also be used in a vertically pivoting truss embodiment, but as with the vertically pivoting truss cup/latch system shown in FIG. 2, the bottom end of the truss adjacent the top pivoting member preferably will not terminate in an end connector, but instead, with a couple member (such as an arcuate shaped member if the vertical is a circular pipe) that will bear against the vertical scaffold member. For instance, the arcuate shaped member 191 may be a half cylinder, with an inner radius equal to that of the outer radius of a vertical scaffold pipe 100, or the couple member could be a clamp, or some combination. As shown in the detail of FIG. 2, the end of the lower horizontal member 20 also has a lower cutout 105 to accommodate the adjacent cup 81 on the vertical scaffold member 100 (see, for instance, FIG. 2 detail). If additional security in the connector is required, a clamp may be used to secure the arcuate shaped member to the vertical scaffold member, such as a pivoting “U” bolt clamp pivotally attached to the horizontal lower member 20 or the arcuate shaped end.

Another pivoting end connector truss embodiment is shown in FIG. 7, using end connectors similar to those in U.S. Pat. No. 3,992,118. The pivoting end connectors 91A and 92B are horizontally pivoting end connectors—the end connector on the horizontal is basically a pivoting short piece of pipe terminating with an upwardly extending tongue member 301 and downwardly extending tongue member 302. As previously described, the upper 91A and lower 91B pivoting end connectors at one end of the truss are placed in the annular channels of the corresponding upstanding cups 81 or annular member on a vertical 100 (e.g. the downward extending tongues 302 are positioned in the annular channel formed by the upstanding cups 81) and then locked into place (here by sliding the reverse cup 305 on the vertical downward, with the slot in the reverse cup 305 aligned with lug 700 on the vertical member. The reverse cup 305 is slid sufficiently far down the vertical to extend past the lug 700, after which the reverse cup 305 is rotated to misalign the slot on the end connector with the lug 700 on the vertical member 100, thereby capturing the upstanding tongue 301 on the pivoting end connector in the annular ring of the reverse cup 305. Once the horizontal end connector is coupled with the end connector on the vertical, the truss is then swung or pivoted outwardly like a swing gate into the proper orientation with the scaffold frame.

This end connector type (cup lock) may also be used in a vertically pivoting embodiment, but as with the vertically pivoting truss cup/latch system shown in FIG. 2, the bottom end of the truss adjacent the top pivoting member preferably will not terminate in a pivoting end connector. However, in the cuplock system, the horizontal end connector tongues may have suitable curvature to form the preferred arcuate couple member, suitably adapted (e.g. the downward facing tongue may not be present on this couple member to avoid interference with the corresponding cup on the vertical). Instead of an arcuate shaped couple member (or as a supplement to a clamp or similar attachment can be positioned on the bottom end connector, which would then be clamped to the vertical scaffold member after the truss has been vertically swung into position, when the clamp would be adjacent to the vertical scaffold member.

As described, the pivoting truss system can be used with most connector types, including traditional tube and clamp scaffolding. Scaffold pipes may be round or other shape. Each connector is configured to “connect” with an annular member on a vertical scaffold member—that is, when the connector engages the annular member, the join supports the truss (the truss may rotate, for instance, but the truss is nevertheless supported by the engagement or connection). The connection may automatically “lock” the vertical to the horizontal (such as in the Excel type spring loaded latch type connectors, or may require action on the part of the operator to lock the horizontal to the vertical (such as in the cup-lock type of connectors, the Safeway type of connectors, or the pin-lock type of connectors).

Another embodiment of the truss member is shown in FIG. 8. As shown in this figure, truss member 1 has connectors 90A, 90B, 91A and 91B that are pin lock type connectors. Connector 91A is mounted to the upper member 10 and is mounted to allow the truss member 1 to pivot vertically. Connector 90B is fixedly attached to lower member 20 on the same truss end as connector 90A, and does not pivot. The opposite end of truss member 1 has connectors 91A and 91B attached to the upper and lower members respectively, and are configured to allow the truss member to pivot in the horizontal plane. This “dual” pivoting truss allows a single truss member to be used at the user’s discretion for vertical or horizontal pivoting, thus eliminating the need to keep separate inventory
of two different types of truss members. The "dual" pivoting truss can be used with end connectors other than pin lock type, as described previously.

[0046] It is understood that others have tried to use a system where the entire horizontal member, including the connector, pivots in the vertical connector (generally, a rosette). However, in such a system, the standard openings in the rosette cannot be used, as the openings in the standard rosette are designed to tightly couple the horizontal to the vertical. Hence, non-standard rosettes must be used, and hence, non-standard verticals. One of the benefits of the present system is that the standard vertical connector and standard horizontal connect can be used with no modifications, as the connector pivots with respect to the horizontal pipe. For pinlock type of connectors for vertical pivoting, the jaws of the opening on the truss member fixed connector may be widened to assist installation (see FIG. I, where the upper 1000 A and lower jaw 1000 B are not parallel, but the upper jaw 1000 A is set at an angle (here 28 degrees).

[0047] The truss member connectors described as being fixedly attached to the upper or lower pipe may also be pivotally attached. As described above, the pivoting truss member is used to erect an overhead supported offset scaffold deck. The pivoting truss member is not limited to that application, as there may be applications where the stiffness and extra support of a truss member is needed in a non-overhead supported scaffold structure, and the pivoting truss allows for ease of installation in such applications.

1. A scaffold horizontal truss comprising an upper horizontal member and a lower horizontal member, each separated from the other but fixedly joined with at least one bracing member, each horizontal member having a first and second end respectively, first connectors, each configured to removably connect to a scaffold vertical member at an annular member positioned on a scaffold vertical member, said first end of each of said lower and upper horizontal members having one of said first connectors attached thereon, a second connector configured to removably connect to a scaffold vertical member at an annular member positioned on a scaffold vertical member and pivotally attached on said second end of at least one of said upper or said lower horizontal members.

2. The scaffold horizontal truss system of claim 1 or 19 wherein said second connector is pivotally attached to said second end of said upper horizontal member.

3. The scaffold horizontal truss system of claim 1 or 19 wherein each second ends of each of said upper and lower horizontal members have pivotally attached thereon one of said said second connectors.

4. (canceled)

5. The scaffold horizontal truss member of claim 1 or 19 where said second connector pivots either horizontally or in a plane substantially perpendicular to that of the respective vertical scaffold member, or vertically or in a plane substantially parallel to that of the respective vertical scaffold member, when said scaffold horizontal truss is coupled thereto.

6. (canceled)

7. The scaffold horizontal truss of claim 1 or 19 further comprising a couple member position on said second end of said lower horizontal member, said couple member shaped to engage a vertical scaffold member.

8. (canceled)

9. The scaffold horizontal truss of claim 1 or 19 wherein said first and second connectors further comprise a latch member comprising a slidable or a pivotable latch engagable with an annular member on a vertical scaffold member.

10. (canceled)

11. (canceled)

12. The scaffold horizontal truss member of claim 9 wherein said annular member on said vertical scaffold member comprises a rosette having an opening and said latch member is vertically slidably through said rosette openings.

13. A method of erecting a suspended scaffold platform to an existing scaffold structure having vertical scaffold members, comprising the steps of:

coupling a first horizontal scaffold member to an annular member on a first vertical scaffold member of said existing scaffold structure with a first connector, said first horizontal scaffold member having first and second ends, said first connector pivotally mounted on said first end of said first horizontal scaffold member, said first horizontal scaffold member further comprising a second connector positioned on said second end of said first horizontal scaffold member and configured to be engageable with another vertical scaffold member;

rotating said coupled first horizontal scaffold member about said first connector to position said second end of said first horizontal scaffold member from a location proximal the existing scaffold structure into a desired orientation distal from the existing scaffold structure;

coupling a second horizontal scaffold member to an annular member on a second vertical scaffold member of said existing scaffold structure with a third connector, said second horizontal scaffold member having first and second ends, said first connector pivotally mounted on said first end of said second horizontal scaffold member, said second horizontal scaffold member further comprising a fourth connector positioned on said second end of said second horizontal scaffold member and configured to be engageable with another vertical scaffold member;

rotating said coupled second horizontal scaffold member about said third connector to position said second end of said second horizontal scaffold member from a location proximal the existing scaffold structure into a desired orientation distal from the existing scaffold structure;

placing scaffold planking boards over said rotated first and second horizontal scaffold members;

coupling a third vertical scaffold member to said second connector of said first horizontal scaffold member;

coupling a fourth vertical scaffold member to said fourth connector of said second horizontal scaffold member;

supporting said third vertical scaffold member from an overhead structure;

and supporting said fourth vertical scaffold member from an overhead structure.

14. The method of claim 13 wherein said first and second horizontal scaffold members are rotated either horizontally or vertically with respect to said existing scaffold structure.

15. (canceled)

16. The method of claim 13 or 14 wherein said first and second horizontal scaffold members each further comprise a first and second truss, each truss having upper and lower members spaced apart but fixedly joined together by bracing members, where said first connector is positioned on said first end of said upper member of said first truss, and said third connector is positioned on said second end of said upper member of said second truss.
17. The method of claim 16 wherein said lower members each have a connector positioned on the second end and configured to connect to an annular member on a vertical scaffold member.

18. The method of claim 16 wherein said second and fourth connector are fixedly attached on said second end of said first horizontal scaffold member and said second horizontal scaffold member respectively, and configured to connect to an annular member positioned on a scaffold vertical member.

19. A scaffold horizontal truss of claim 1 wherein said first connectors are pivotally attached on each of said first ends of said upper and lower horizontal members.

20. The scaffold horizontal truss of claim 19, wherein said first connectors are configured to pivot said scaffold horizontal truss in a horizontal plane when said scaffold horizontal truss is coupled to a vertical scaffold member at said first connectors, and said second connector is configured to pivot said scaffold horizontal truss in a vertical plane when said scaffold horizontal truss is coupled to a vertical scaffold member at said second connector.

21. The scaffold horizontal truss of claim 1 wherein said first connectors are fixedly non-pivotally attached on said first ends of said upper and lower horizontal members.

22. The method of claim 13 where said step of rotating said first horizontal scaffold member is independent from the step of rotating said second horizontal scaffold member.