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(54) Title: MODULAR SUPPORT FRAME

(57) Abstract: A modular support frame comprises trusses, purlins transverse to the trusses, and vertical posts supporting the various trusses. A supply of wedges permits flange-type connectors to be joined to complementary connectors throughout the foundation. The trusses are arranged end-to-end in parallel rows, each row comprising at least one pair of trusses or more depending on the desired size of the foundation. Vertical posts are positioned between the ends of each of the trusses within a row and at opposing ends of the row, and each post comprises a pair of flange-type connectors at predetermined heights. Each of the trusses is terminated at either end with a pair of complementary connectors such that adjacent in-line trusses can be mounted to the post between them and the outer pair of trusses can be mounted to the posts terminated the row. Purlins extend perpendicularly between the trusses in adjacent rows to reinforce the frame. To that end, the trusses comprise flange-type connectors and the purlins are terminated at either end with complementary connectors.

Modular Support Frame

Technical Field

The invention relates to modular support frames that can be used to form foundations for housing, to form a platform or the like.

Background Art

It is common in cold northern regions to erect a modular foundation to support modular housing. The foundation may be assembled with myriad structures each comprising a lower junction and a multiplicity of tubular struts that radiate upward and outward in various directions from the junction. There are significant shortcomings to this arrangement. A crane may be required to position such structures in adjacent relationship, and nut and bolt fasteners may be required to join adjacent. A T-brace may be required to provide additional support to overhead beams. Lastly, considerable labour is required to assemble the foundation. Other support frames pose similar problems.

Disclosure of Invention

The invention provides a modular support frame that is assembled with particular connectors. The configuration of such connectors is apparent in U.S. Patent No. 5,411,113 to the present invention. The connectors have become common in the assembly of scaffolds, but not foundations and comparable supporting frames. Each joint comprises a horizontal flange connected as by welding to one component to be joined. The flange has multiple circumferentially spaced openings. A complementary connector is welded to the other component to be joined. The complementary connector comprises upper and lower sections that define a horizontal mouth for receiving the flange, and comprises openings in the upper and lower sections of the complementary connector that allow a wedge to be received and extended through one of the openings in the flange, thereby

securing the joint.

In one aspect, the invention provides a support frame comprising trusses, vertical posts supporting the trusses, and purlins mounted between the trusses. The trusses are arranged end-to-end in a multiplicity of parallel rows, each row comprising at least one pair of trusses or more depending on the desired size of the support frame in the general direction of the trusses. The number of parallel rows of trusses sets the size of the support frame in a direction transverse to the trusses. This arrangement allows a support frame of desired size to be assembled using sets of identical trusses, purlins and posts.

Each truss has a pair of connectors at either end that is complementary to flange-type connectors associated with the posts. The complementary connectors are positioned at heights corresponding to the heights of the flange-type connectors associated with the posts. A post, which may typically have a base capable of seating on a generally horizontal surface, is positioned between each pair of trusses within a given row. Each row of trusses is terminated at either end with a post, and the trusses adjacent to these outer posts may be connected to the posts using the flange-type connectors associated with the posts and the complementary connectors at outer ends of the trusses. A similar arrangement of trusses and posts, transverse to the rows, may be used to join and terminate the ends of the various rows of trusses.

The purlins serve to reinforce the support frame defined by the rows of trusses. Each purlin extends perpendicular to and joins a pair of parallel trusses located in adjacent rows. To that end, each truss may comprise one or more flange-type connectors. Each purlin has a pair of opposing ends terminated with complementary connectors so that the purlin may be fastened to the flange-type connectors associated with the adjacent parallel trusses. In modular housing, it may be sufficient to extend a single purlin between

adjacent parallel pairs of trusses. In modular platforms, multiple purlins may extend between adjacent parallel pair of trusses to provide better support for wooden floor panels laid atop the support frame, and each truss may carry multiple flange-type connectors, spaced to accommodate the multiple purlins. In preferred form, the trusses preferably comprise three horizontal cords, one lowermost, one uppermost and one intermediate but proximate to the top chord. An upright extends between the chords, and the truss's flange-like connector may be welded to the upright in a horizontal orientation between the upper and intermediate chords. In preferred form, in a platform, each of the purlins may comprise a lengthwise groove in its upper surface in which is located a material (typically wood or plastic) that can be penetrated by a nail and hammering. The panels associated with the platform can be nailed into place.

The support frame is preferably constructed of aluminum to reduce overall weight. The advantage of the support frame is that two workers can assemble the support fame in a matter of hours, which has not been possible in the prior art.

The Drawings

The invention will be better understood with reference to drawings illustrating embodiments of the invention, in which:

Fig. 1 is a perspective view of a modular support frame;

Fig. 2 is a perspective view of a post used to support trusses;

Fig. 3 and 4 are a plan view and a side elevation respectively of a truss;

Figs. 5 and 6 are sectional views along uprights within the truss of figs. 3 and 4;

Figs. 7 and 8 are a plan view and a side elevation respectively of a purlin that normally extends horizontally between trusses;

Fig. 10A is a plan view of a flange-type connector;

Fig. 10B is a side elevation of a post used to support trusses;

Figs. 11 and 12 are a plan view and a side elevation respectively of an outboard foundation truss;

Figs 13 and 14 are sectional views of posts forming part of the truss of figs. 11 and 12;

Fig. 15 and 16 are a plan view and side elevation of an outboard longitudinal foundation truss.

Figs. 17 , 18 , 19 and 20 are sectional views of fig. 16;

Fig. 21 is a side view of cap structure for posts that enhance support for floor panels or structures;

Fig. 22 is a perspective view of a modular support frame adapted to support a stage of floor panels;

Fig. 23 is a fragmented view showing corner construction in the modular support frame of fig. 22;

Lists of components and associated part numbers may be found in figs. 1 and 25.

Description of embodiments of the invention

Reference is made to fig. 1, which illustrates an assembled modular foundation suitable for supporting modular housing. The foundation comprises a multiplicity of trusses arranged in 6 rows, each row comprising a pair of trusses arranged in-line. The construction of the trusses is more apparent in figs. 3-6. What should be noted is that each truss is terminated at either end with a pair of connectors complementary to flange-type connectors. Also, each truss carries a flange-type connector at an upper end.

The foundation also comprises a multiplicity of posts. A typical post is apparent in fig. 2 where it may be seen to comprise a base plate for standing on a horizontal surface, and a pair of vertically spaced-apart flange-type connectors. One post is positioned between the trusses in each of the rows, and both trusses are fastened to the post by securing the pair of complementary connectors terminating ends of the trusses adjacent to the post to the flange-type connectors of the post. Each row is terminated at either end with a post, and ends of the trusses proximate to the post are fastened to the post by mating the flange-type connector associated with the posts to the complementary connectors at the proximate end of the truss.

The foundation also comprises a multiplicity of beams that extend perpendicular to the rows of trusses and serve to join adjacent parallel trusses to one another to stabilize the rows. A typical beam is shown in figs. 7 and 8. It should be noted that the beam is terminated at either end with a connector complementary to the flange-like connectors carried atop the trusses. In this implementation of the invention, only a single beam extends between trusses in adjacent row, fastening to the flange-type connectors of the trusses. However, if required, each truss may be topped with multiple flange-type connectors and multiple beams terminated with complementary connectors may be used to join adjacent trusses.

The rows of trusses are terminated at opposing ends with additional trusses, which are apparent in figs. 11-20. These trusses are also terminated at either end with a pair of connectors complementary to the flange-type connectors associated with the posts. These trusses are mounted to the posts terminating the rows and oriented perpendicular to the rows. Fig. 21 shows a typical cap that may be mounted to the posts terminating the rows to match the height of flooring mounted on the foundation.

Fig. 22 shows another modular support frame, this one adapted to support wooden floor panels to form a stage. Like the support frame of fig. 1 there are trusses in multiple parallel rows, posts that support in-line adjacent trusses, and purlins extending between the trusses. It will be noted that multiple trusses extend between each pair of trusses and adjacent rows of purlins extend at between. Each purlin comprises a lengthwise channel in an upper surface of the purlin containing a lengthwise wood insert. This allows floor panels to be nailed easily in place. The upper surface may be provided by using I-beam construction to define both the upper and lower surfaces of the purlins. It should be noted that the central lengthwise row of trusses has been eliminated. Instead purlins are fastened between the exterior and interior posts.

Fig. 24 shows an alternative purlin construction for the purlins used in the platform of fig. 22. This incorporates a double T-slot construction. Yet another type of purlin is shown in fig.25, essentially a double ledger construction.

Other aspects of the invention will be apparent from the drawings and this disclosure, and may fall within the ambit of the claims.

The Claims

1. A modular support frame comprising:

a plurality of trusses arranged in parallel rows, each of the rows comprising at least one pair of trusses, each of the trusses in each row comprising a vertical general plane aligned with the vertical general plane of each other truss in each row, each of the trusses comprising a pair of vertically spaced-apart connectors located at each end of the truss and adapted to mate with a circular flange-type connector, each of the trusses comprising a horizontally oriented flange-type connector;

a plurality of posts, each of the posts comprising an upper and a lower flange-type connector, each of the trusses being associated with a pair of the posts with one post located at each end of the associated truss and being mounted to the associated posts using the connectors at either end of the truss;

a plurality of purlins oriented perpendicular to the trusses, each of the purlins comprising a connector fastened to the flange-type connector of one of a pair of trusses in adjacent rows, each of the purlins comprising a connector fastened to the flange-type connector of the other of the pair of parallel trusses; and

a supply of wedges for joining flange-type connectors and complementary connectors throughout the support frame.

2. The modular support frame of claim 1 in which:

each of the purlins comprises a lengthwise groove in its upper surface and an elongate insert closely received within the groove;

each of the inserts is formed of a material capable of receiving a nail by hammering;

a multiplicity of wooden panels is mounted on the upper surfaces of the

purlins to define a flat deck; and,

each of the wood panels is nailed to one or more of the inserts associated with the purlins.

3. The modular support frame of claim 1 in which:

each of the trusses comprises three horizontal chords including a lowermost chord, an uppermost chord, an intermediate cord between the uppermost and lowermost cords, an upright extending between the intermediate and uppermost; and,

the flange-type connector associated with each truss is fastened to the upright of the truss between the intermediate and uppermost chords of the truss.

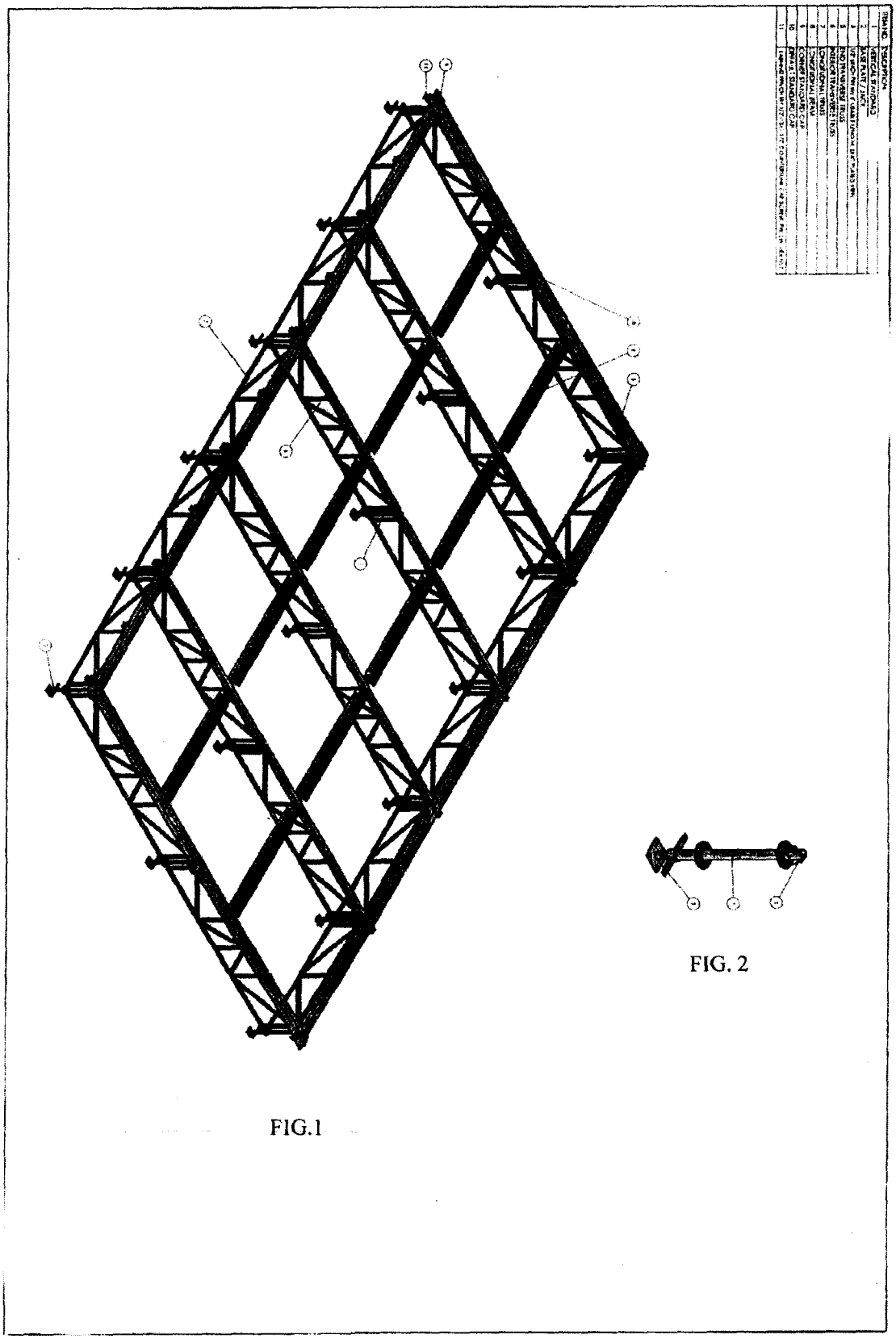

FIG.1

FIG. 2

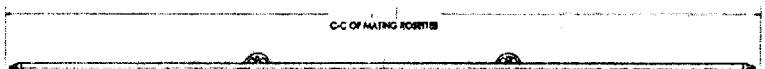

FIG.3

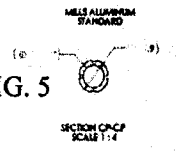

FIG. 5

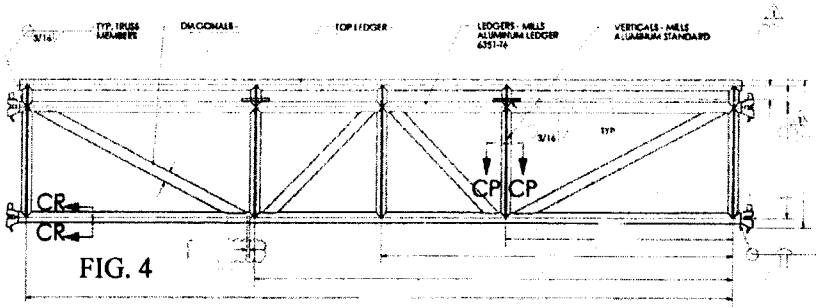

FIG. 4

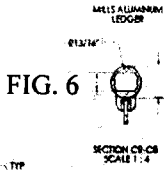

FIG. 6

INBOARD 12FT FOUNDATION TRUSS
SCALE 1 : 12
6

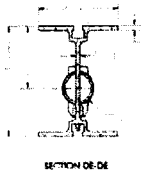

FIG. 9

LONGITUDINAL FOUNDATION SUPPORT
8

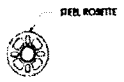

FIG. 10A

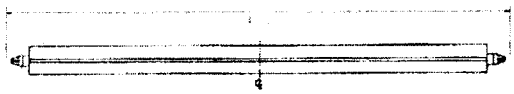

FIG. 7

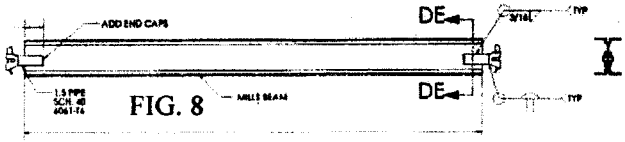

FIG. 8

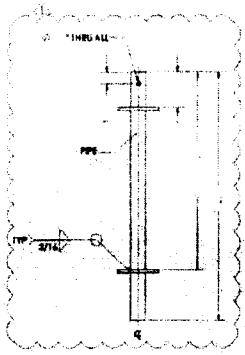

FIG. 10B

VERTICAL STANDARD
SCALE 1 : 9

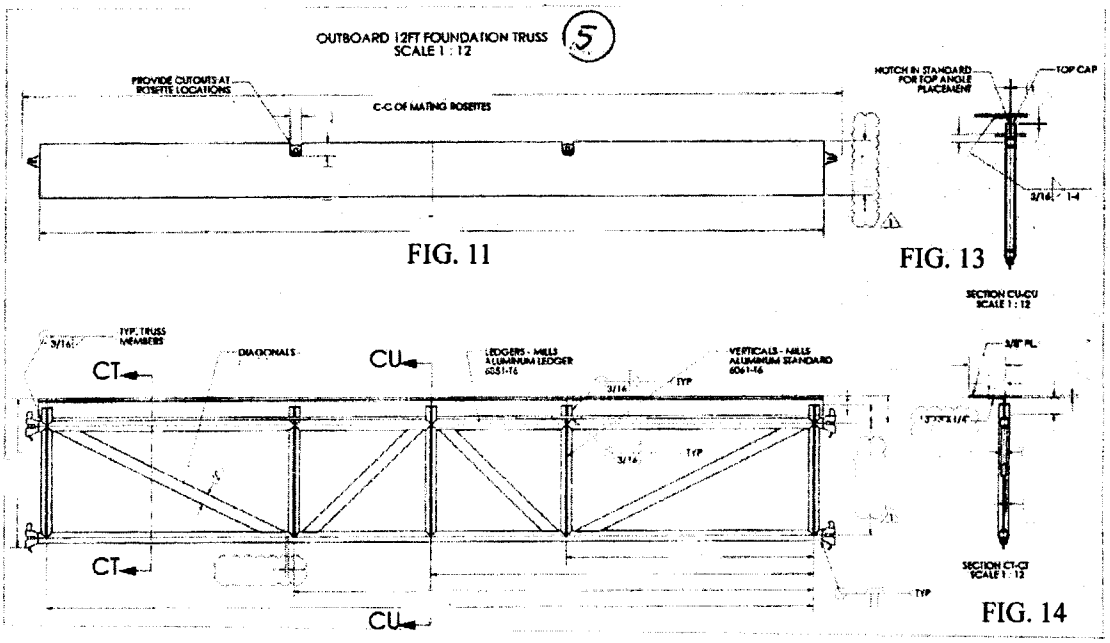

FIG. 11

FIG. 12

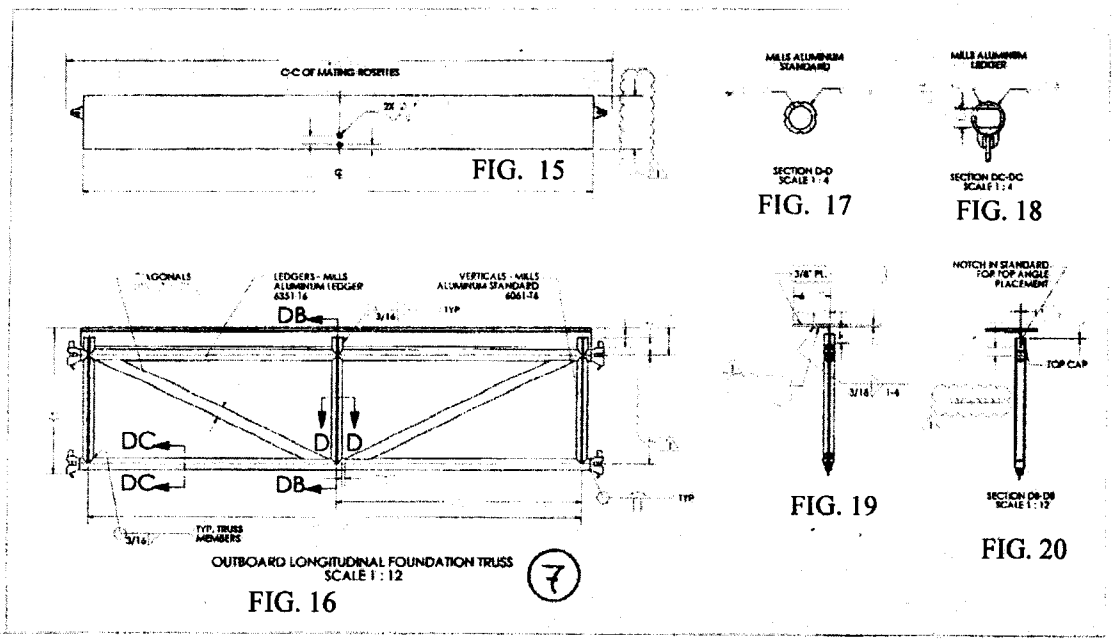

FIG. 15

FIG. 16

FIG. 17

FIG. 18

FIG. 19

FIG. 20

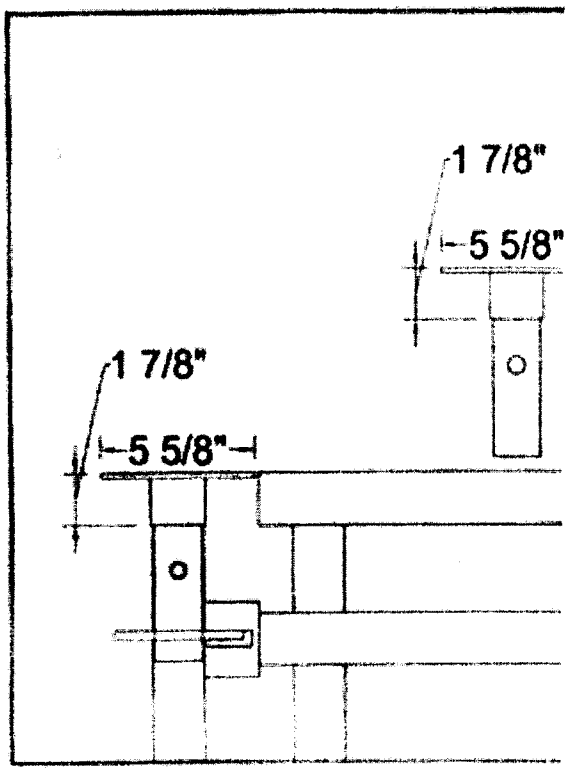

FIG. 21

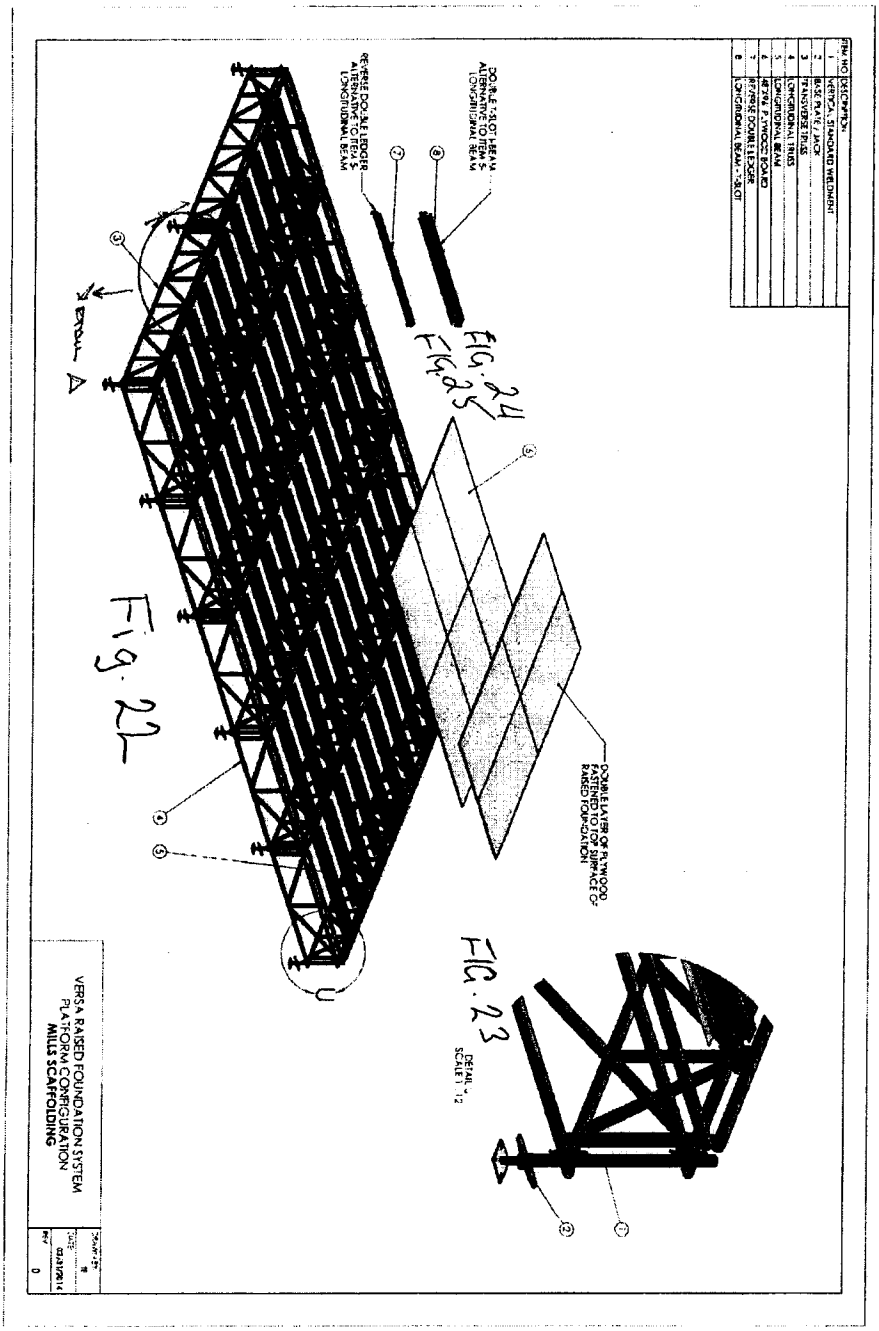

Fig. 24
Fig. 25
Fig. 22
Fig. 23