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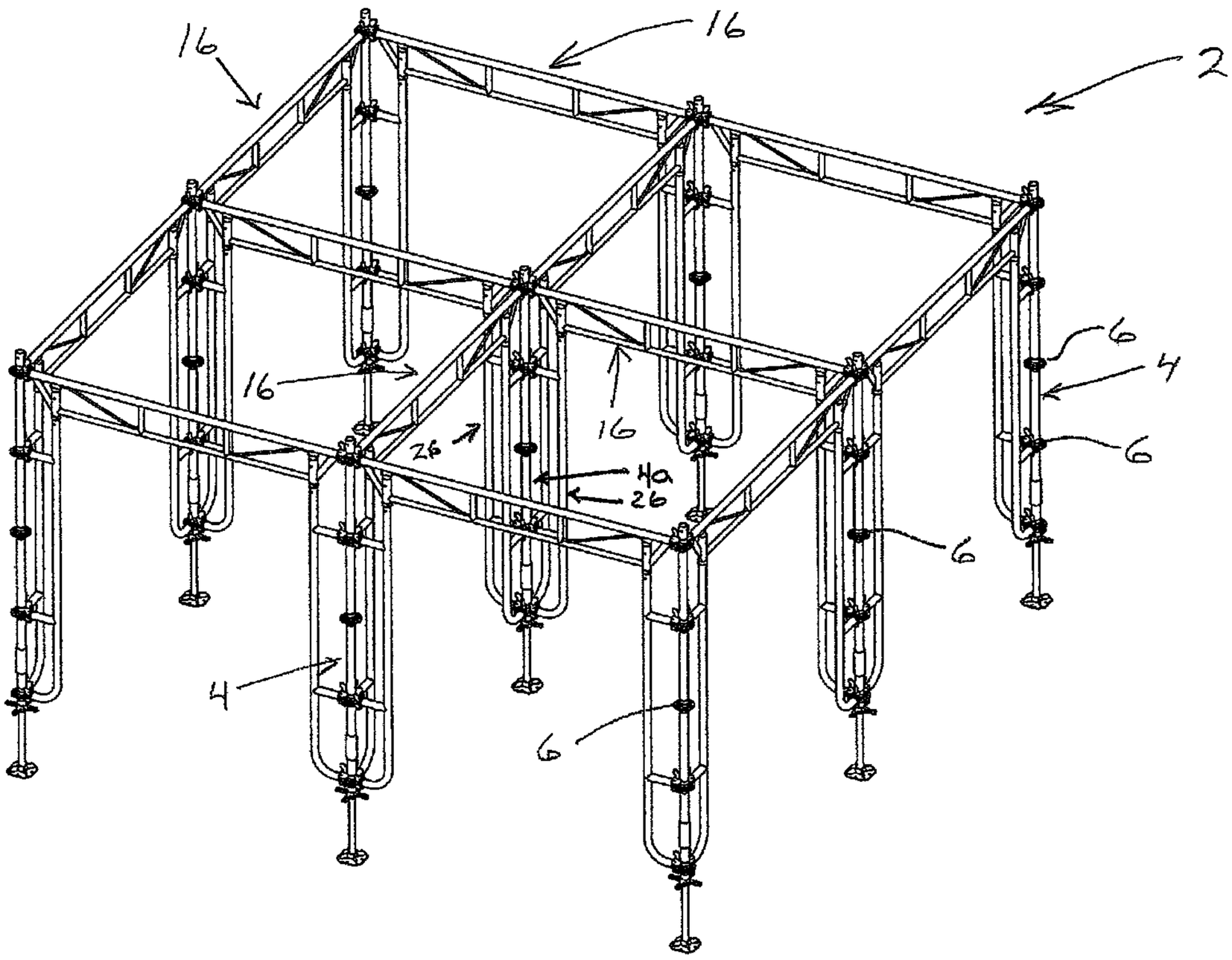
(54) Titre : SYSTEME DE LONGERON RENFORCE ET DE JAMBE DE FORCE
(54) Title: REINFORCED LEDGER AND KNEE BRACE SYSTEM



(57) Abrégé/Abstract:
A reinforced ledger includes the ability to releasably engage vertical brace arrangements that cooperate and brace scaffold legs supporting the reinforced ledger. The reinforced ledger includes a pair of socket tubes provided adjacent opposite ends of the ledger and preferably the socket tubes provide a structural connection of the top and bottom chords of the reinforced ledger. The socket tubes receive a spigot of a brace member and the brace member supports the lower edge of the ledger. Each brace member transfers load to a connected scaffold leg while reinforcing the scaffold leg. Preferably the spigot of the brace member allows rotation of the brace member about a longitudinal axis of the socket tube.

WH 13519

ABSTRACT

A reinforced ledger includes the ability to releasably engage vertical brace arrangements that cooperate and brace scaffold legs supporting the reinforced ledger. The reinforced ledger includes a pair of socket tubes provided adjacent opposite ends of the ledger and preferably the socket tubes provide a structural connection of the top and bottom chords of the reinforced ledger. The socket tubes receive a spigot of a brace member and the brace member supports the lower edge of the ledger. Each brace member transfers load to a connected scaffold leg while reinforcing the scaffold leg. Preferably the spigot of the brace member allows rotation of the brace member about a longitudinal axis of the socket tube.

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TITLE: REINFORCED LEDGER AND KNEE BRACE SYSTEM

FIELD OF THE INVENTION

The present invention relates to modular scaffolding systems and in particular relates to a reinforced ledger for modular scaffold systems. In a preferred embodiment the reinforced ledger includes bracing members in engagement with scaffold legs for forming a reinforced knee brace arrangement.

BACKGROUND OF THE INVENTION

Perhaps the most common scaffolding system used today includes scaffold frames releasably interconnected by cross brace members. These prefabricated frames include various connection points for engaging cross brace members as well as horizontal members. The frames are available in different configurations to suit the specific work that is being undertaken. In applications where high loads are required, it is common practice to reduce the spacing between horizontal frames from the traditional 10 foot spacing to a spacing of 6 feet or 4 feet. Speciality frames are also known that allow for an archway to define a pedestrian or worker pathway through the frames. The legs of these archway frames are strengthened by an integral knee brace arrangement welded to essentially the full height of each frame leg. These integral braces essentially twin the leg and avoid the need for expensive tube and clamp bracing to be secured to the frame legs. These specialty frames are less expensive to erect than the tube and clamp equivalent arrangement.

One disadvantage of using speciality frames to provide a clear passageway through the base of the scaffold structure is that the frames are quite wide and tall, making them unsuitable for general use. Therefore

these frames typically have a low utilization factor compared to a conventional frame.

A further issue associated with the use of speciality frames is associated with multiple bays that extend in both directions. As frames are typically linked with cross brace members, trying to provide pedestrian or worker passageways in both directions is difficult as the cross brace members obstruct the free access in the opposite direction.

Tube and clamp scaffolding systems are well known, and essentially the workers assemble the systems onsite and the system readily responds to changes in configuration as the tube and clamp design provides great flexibility. Unfortunately, with tube and clamp systems, the cost to erect such a system is more expensive and requires skilled labour.

Modular scaffolding systems are also known that are generally a hybrid between the scaffold frame systems and the tube and clamp systems. With this arrangement, the verticals include predetermined connection members spaced along their length, and these can engage horizontal and diagonal bracing-type members having connectors at their ends. With this type of arrangement, the system can be erected more quickly, and there is a reduced possibility that the system is not erected properly.

Modular scaffold systems suffer from the same shortcomings as tube and clamp scaffolds when they are used to span across openings, or provide unrestricted access beneath scaffolds. Single modular verticals typically are not capable of withstanding the entire load, and must be reinforced by a knee brace type arrangement, or the verticals must be linked together in

pairs or clusters in order for them to provide sufficient stiffness. These approaches to increase load carrying capability are expensive and require experienced erection personnel and perhaps the services of an experienced engineer to ensure that the resulting structure is capable of supporting the required loads.

It is also known to use reinforced ledgers for connecting to adjacent scaffold legs where higher loads are being carried by the ledger. These reinforced ledgers provide more load carrying capability along the length thereof, however this load is effectively carried by the legs at either end of the ledger head, and this is often the limiting factor.

The present invention seeks to overcome a number of these disadvantages and provide a cost effective approach for defining pedestrian access passageways or areas where obstructions are reduced.

SUMMARY OF THE INVENTION

A scaffolding system of the present invention has a series of upright scaffold legs with connectors fixedly secured along the length of each upright scaffold leg for releasably connecting with horizontal members and/or diagonal bracing members. These connecting members have connecting heads at opposite ends thereof for releasable securement to the scaffold legs. The system includes reinforced ledgers where each reinforced ledger includes a top chord with a connecting head at opposite ends thereof for selective securement with the connectors of the upright scaffold legs, and a bottom chord positioned below the top chord and fixedly secured thereto adjacent opposite ends of the top chord. Each reinforced ledger includes a pair of socket tubes positioned inwardly of

and adjacent to the ends of the top chord. The socket tubes open downwardly and extend above the bottom chord towards the top chord. These socket tubes are sized to receive and engage a spigot of a vertical bracing member.

In an aspect of the invention, the socket tubes are located at opposite ends of the bottom chord and form a fixed structural connection between the bottom chord and the top chord.

In yet another aspect of the invention, the bottom chord is of a length less than the top chord and centered beneath the top chord with the socket tube secured at opposite ends of the bottom chord.

In yet a further aspect of the invention, the scaffolding system includes removable vertical brace members where each vertical brace member includes at one end thereof, a spigot sized for receipt in and connection with any of the socket tubes. The vertical brace member includes an upright portion beneath the spigot and at least one short arm extending outwardly from the upright portion with each short arm having a connecting member. Each short arm is positioned for engagement with a connector of an upright to provide further support of the reinforced ledger in which the spigot has been received. With this arrangement, the reinforced ledger is provided with additional support by downwardly extending vertical support members with these vertical support members positioned to one side of the scaffold leg, and connected thereto by one or more releasable connecting members.

BRIEF DESCRIPTION OF THE DRAWINGS

Preferred embodiments of the invention are shown in the drawings, wherein:

Figure 1 is a perspective view of a four bay arrangement defined by the scaffold legs, the vertical brace members and the reinforced ledgers;

Figure 2 is a perspective view of the reinforced ledger and an associated upright scaffold leg shown in dotted lines;

Figure 3 is a perspective view showing the reinforced ledger connected to two spaced scaffold legs shown in dotted lines;

Figure 4 is a perspective view showing vertical brace members being secured to the reinforced ledger;

Figure 5 shows the further assembly of the vertical brace members after being inserted into the spigot tubes;

Figure 6 shows the vertical brace members secured to the reinforced ledger and now connected to the scaffold legs; and

Figure 7 shows a reinforced ledger connected to two vertical scaffold legs and associated locking pigtail pins.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

The scaffold system 2 shown in Figure 1 illustrates a modular scaffolding system using upright vertical legs 4 having connectors 6 fixed thereto at different spacings along the length thereof. The vertical upright legs 4 are typical of a modular scaffolding system where a series of rosettes are welded or otherwise secured to the scaffold leg at fixed spacings along the length thereof for connecting with horizontal members as well as diagonal bracing members. Typically, these diagonal members and horizontal members have a connecting head at one end thereof with a wedge member for providing a simple and efficient connection of the members to the vertical uprights.

Figure 1 illustrates the reinforced ledgers 16 connecting individual vertical upright legs 4. The reinforced ledgers can also be used for connecting of scaffolding frames having connecting rosettes or appropriate structure. In general, reinforced ledgers are known, and these ledger members typically include a top chord and a bottom chord to provide the additional load carrying capability. These known reinforced ledgers do not include the socket tubes 22 that mechanically connect the bottom chord 20 to the upper chord 18 as shown in the present drawings. These socket tubes advantageously allow connection of the reinforced ledger to the vertical brace members 26 as shown in Figures 2 through 7.

In Figure 1, a four bay arrangement has been illustrated where there are passageways defined in both directions between all of the scaffold legs. The scaffold legs have been reinforced by the vertical brace members 16 and it can be seen that the center vertical upright leg 4a includes four vertical brace members 26. Each of these vertical brace members 26 is associated with one of the reinforced ledgers 16.

Figure 2 shows details of the reinforced ledger 16. This reinforced ledger includes the top chord 18, a bottom chord 20 generally centered beneath the top chord and of a length shorter than the top chord. A pair of socket tubes 22 are positioned at opposite ends of the bottom chord 20 and form a mechanical connection of the bottom chord to the top chord 18. The reinforced ledger 16 also includes a fixed center support 23 and triangular gussets 25. Other bracing of the top and bottom chords can be used.

The reinforced ledger 16 includes a center structural member 23 extending between the top and bottom

chords, and triangular gusset members 25. The reinforced ledger 16 is further strengthened by the diagonal brace members 31 and 33 that connect the socket tubes 22 to the respective ends of the top chord 18.

Modification of the configuration of the reinforced ledgers can occur, however the illustrated structure effectively utilizes the socket tubes 22 provided adjacent opposite ends of the bottom chord for advantageously releasably engaging the vertical brace members 26 shown in Figure 4.

In Figure 4, the vertical upright legs 4 are secured by the reinforced ledger 16. The reinforced ledger 16 is secured to the legs due to the engagement of the connecting heads 35 and 37 with the rosette connector 6. The vertical brace members 26 are shown aligned below the socket tubes 22 and the spigot 30 is aligned with the socket tube 22 for insertion therein. Each of the vertical brace members 26 include an upright portion 28 shown with three short connecting arms 32, 34 and 36 that extend outwardly from the upright portion 28 and have a connecting head 38 at the end of each connecting arm. The upright portion has been rotated to a position such that the connecting heads 38 of the arms 32, 34 and 36 are spaced from and do not interfere with the associated rosettes on the upright legs 4. In the position shown in Figure 4, the vertical brace members 26 are positioned to move upwardly such that the respective spigots 32 enter the aligned socket tube 22. The fixed collar 41 engages and provides a load transfer surface with the bottom edge of the respective socket tube.

Figure 5 shows the spigots of the vertical brace members 26 inserted in the socket tubes 22 and the vertical brace members are about to be rotated to bring

the connecting heads 38 into engagement with the corresponding rosettes 6.

In Figure 6, the connecting heads 38 are now positioned for mechanical securement with one of the ports of the rosette connectors 6. This is accomplished by rotating the wedge 39 of the connecting head 38 upwardly and then once it is aligned with the appropriate hole in the rosette, the wedge is moved downwardly and engages and draws the connector into firm engagement with the rosette. This type of engagement is commonly used in the system.

In Figure 7, the vertical brace members 26 are now in engagement with the respective upright scaffold legs 4. Key lock members 42 and 43 are shown for engagement with the port 45 to mechanically fasten the spigots 30 with the socket tubes 22.

In the various figures, the assembly of the reinforced ledger to the separate uprights for the scaffolding system, and the subsequent assembly of the vertical brace members to the legs and reinforced ledger are shown in a vertical orientation. As can be appreciated, it may be more time efficient to initially secure two scaffolding legs, the reinforced ledger and the associated vertical brace members on the ground and then use this as a "assembled frame" for securement in the system. There will always be some need to assemble the overall system in a vertical orientation; however a number of "frames" can be pre-assembled to reduce the overall erection time. These pre-assembled frames need not be broken down when the job is complete and could be stored as frames.

The four bay system as shown in Figure 1 is not the most common or typical arrangement, as often a

passageway for a sidewalk or walkway is only required in one direction. For example, one common application of the system would be the "assembled frames" of Figure 6 in combination with traditional horizontal bracing members and diagonal bracing members extending between frames. Such a system would define a single passageway extending through the frames.

The vertical brace members 26 have been described and shown with respect to the three short arms 32, 34 and 36. As illustrated in Figure 1, the upright portions 28 of the vertical brace members 26 extend over the major length of the upright scaffold legs. This provides excellent reinforcing of the scaffold legs and provides a relatively high load carrying capability. For some applications, the load carrying capacity may not be as great, and the length of the vertical brace members can be reduced. For example, the vertical brace member 26a shown in Figure 8 only includes two short arms, and this may be sufficient for many applications. For some applications a single arm may be sufficient. This still provides good reinforcing of the scaffold legs, and allows the reinforced ledger to carry the design loads. Therefore, it can be readily appreciated that the size and length of the vertical bracing members can change according to the particular requirements. Furthermore, it is apparent that within a given system the vertical bracing members can be of different shapes to provide the required loads.

Although various preferred embodiments of the present invention have been described herein in detail, it will be appreciated by those skilled in the art, that variations may be made thereto without departing from the spirit of the invention or the scope of the appended claims.

THE EMBODIMENTS OF THE INVENTION IN WHICH AN EXCLUSIVE PROPERTY OR PRIVILEGE IS CLAIMED ARE DEFINED AS FOLLOWS:

1. In a scaffold system having a series of upright scaffold legs with connectors fixedly secured along the length of each upright for releasably connecting with horizontal members and diagonal bracing members having connecting heads at opposite ends thereof;

said system including reinforced ledgers where each reinforced ledger includes a top chord with connecting heads at opposite ends thereof for selective securement with said connectors of said uprights and a bottom chord positioned below said top chord and fixedly secured thereto adjacent said opposite ends of said top chord;

each reinforced ledger including a pair of socket tubes positioned inwardly of and adjacent the ends of said top chord;

said socket tubes being open downwardly and extending above said bottom chord towards said top chord;

and wherein said socket tubes are sized to receive and engage a spigot of a vertical bracing member.

2. In a scaffold system as claimed in claim 1 wherein said socket tubes are located at opposite ends of said bottom chord and form a fixed structural connection between said bottom chord and said top chord.

3. In a scaffold system as claimed in claim 2 wherein said bottom chord is of a length less than said top chord and centered beneath said top chord with said

socket tubes secured at opposite ends of said bottom chord.

4. In a scaffold system as claimed in claim 3 including a pair of removable vertical brace members wherein each vertical brace member includes at one end thereof a spigot sized for receipt in and load transfer engagement with any of said socket tubes, each vertical brace member including an upright portion beneath said spigot and at least one short arm extending outwardly from said upright portion with each short arm having a connecting member and said at least one short arm is positioned for engagement with a connector of an upright to provide further support of the reinforced ledger in which said spigot has been received and to transfer load to the associated scaffold leg.

5. In a scaffolding system as claimed in claim 4 wherein said at least one short arm is at least two short arms.

6. In a scaffolding system as claimed in claim 4 wherein said at least one short arm is at least three short arms.

7. In a scaffolding system as claimed in claim 4 wherein each spigot has a load transfer collar at a base of said spigot sized to engage a bottom surface of any of said socket tubes when inserted therein.

8. In a scaffolding system as claimed in claim 4 including releasable securing means for releasably engaging and maintaining a spigot in a socket tube.

9. In a scaffolding system as claimed in claim 8 wherein said securing means includes pig tail pins, bolts or other releasable securing pins.

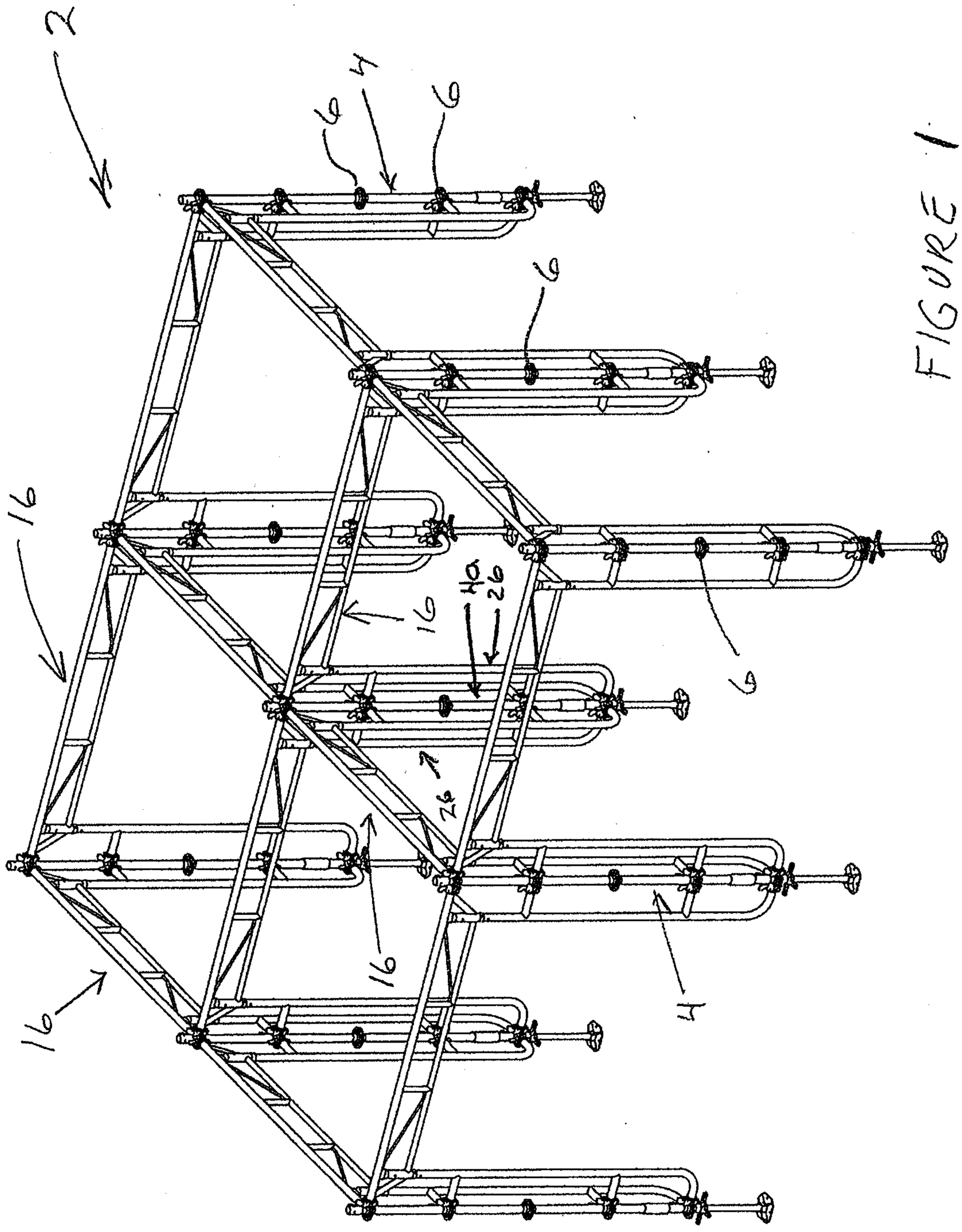


FIGURE 1

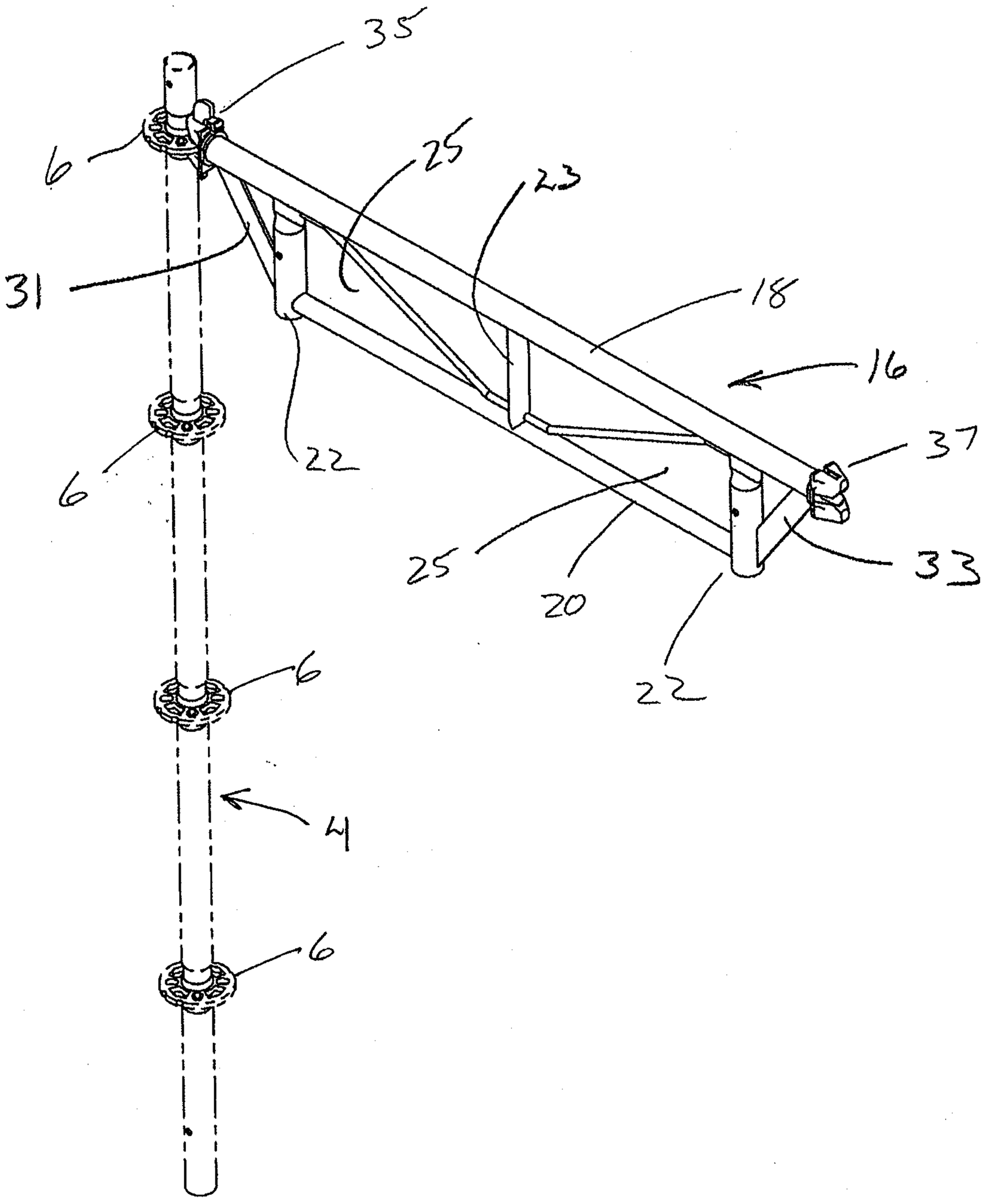
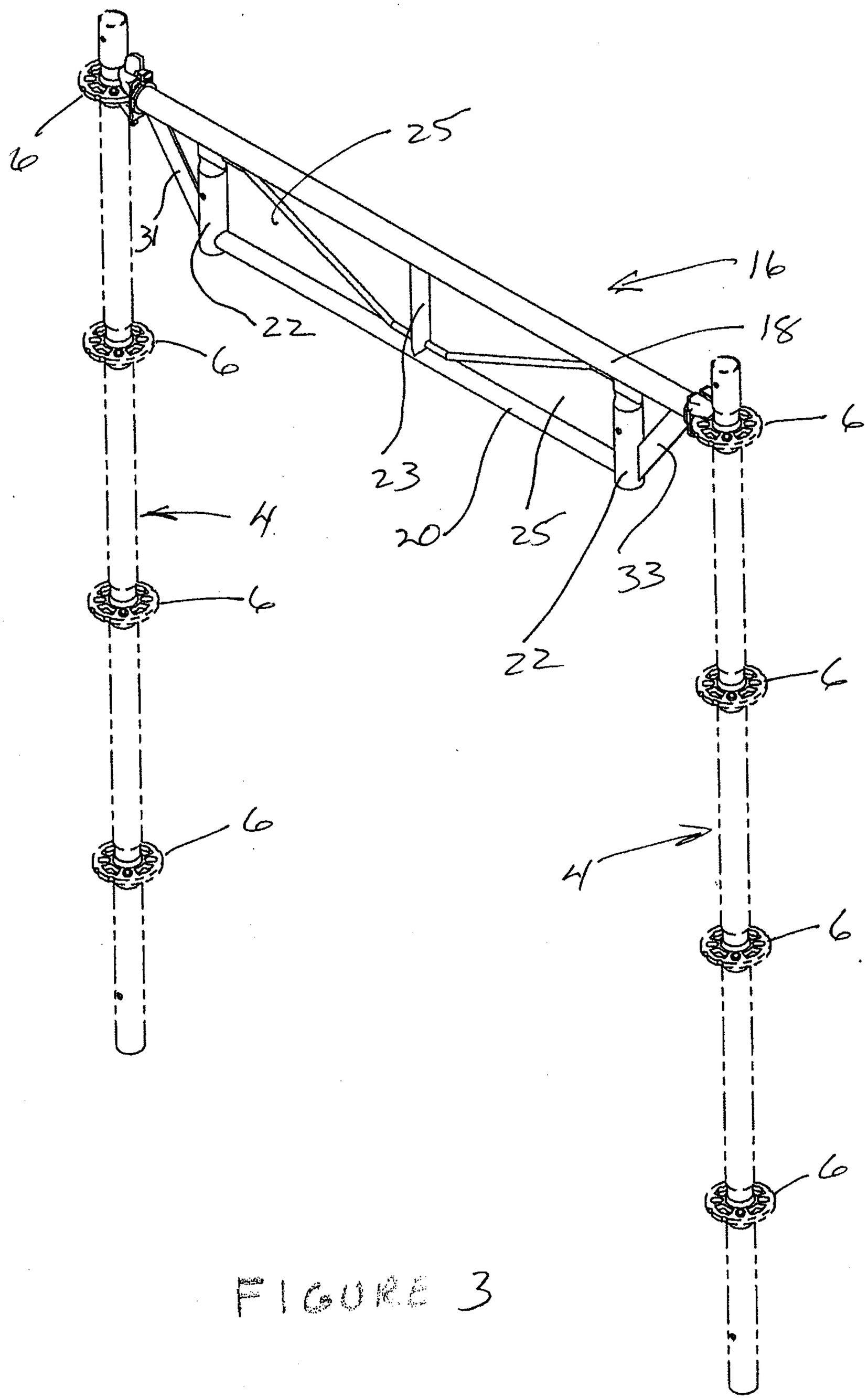


FIGURE 2



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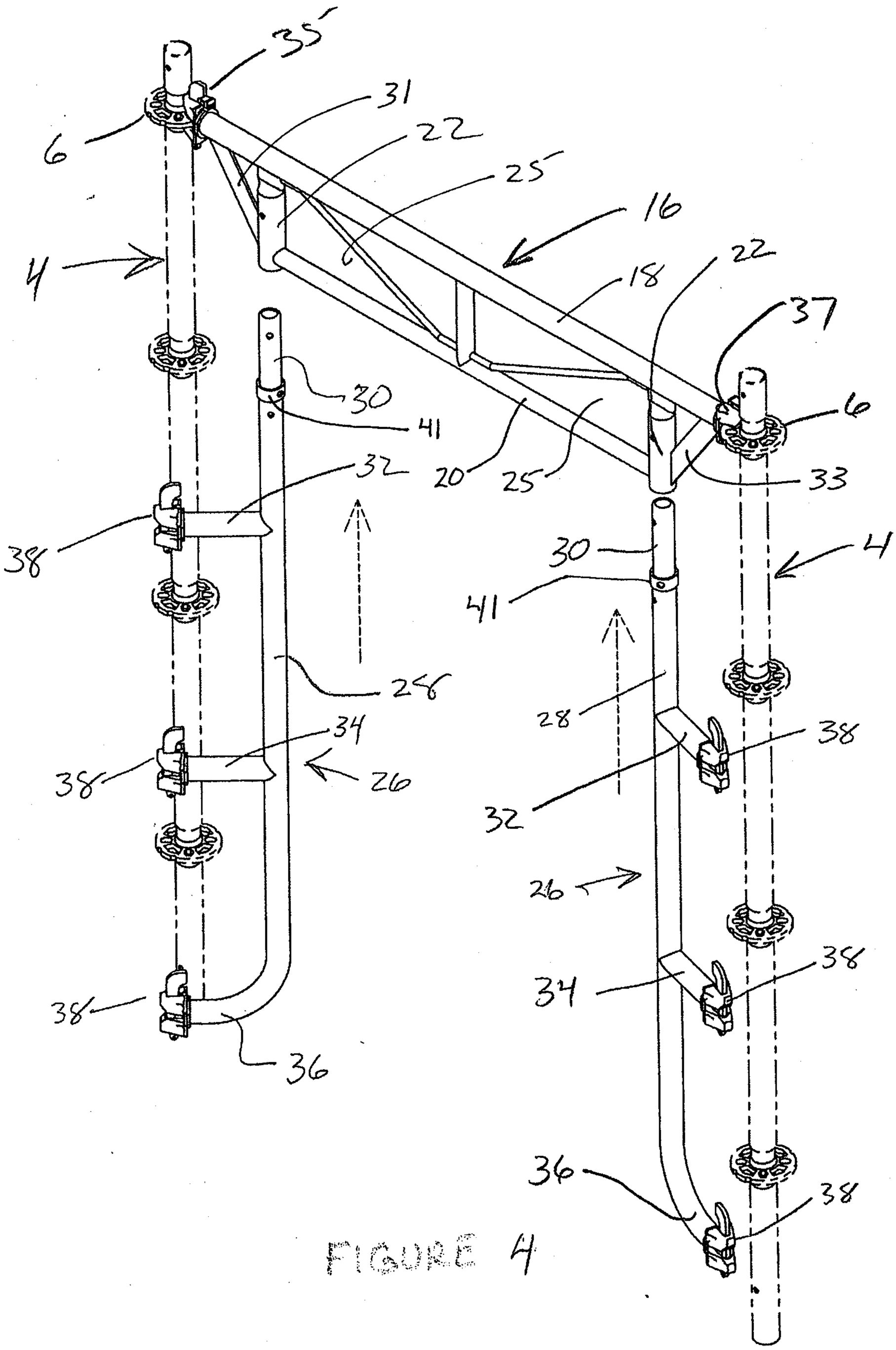
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FIGURE 4

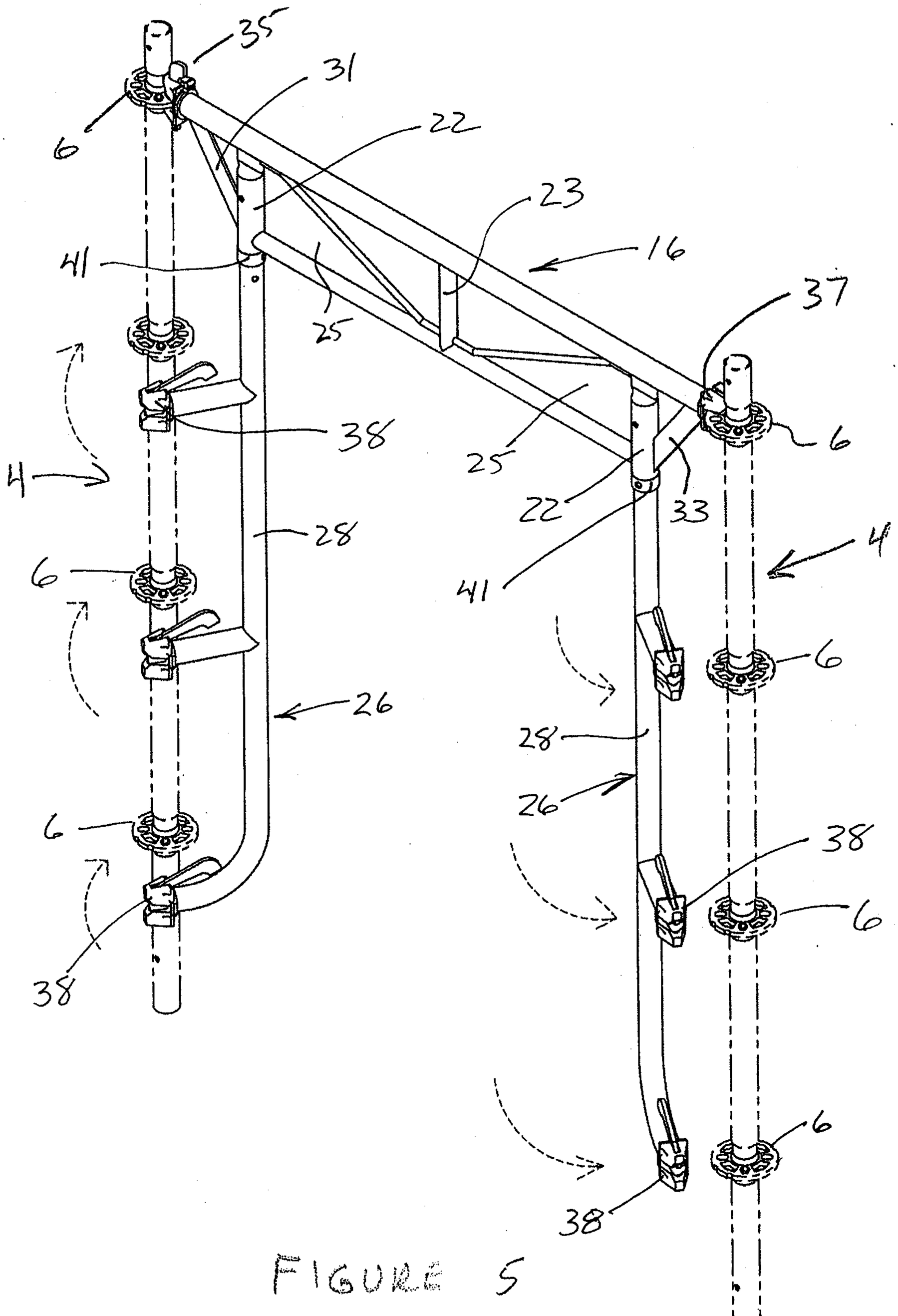
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FIGURE 5

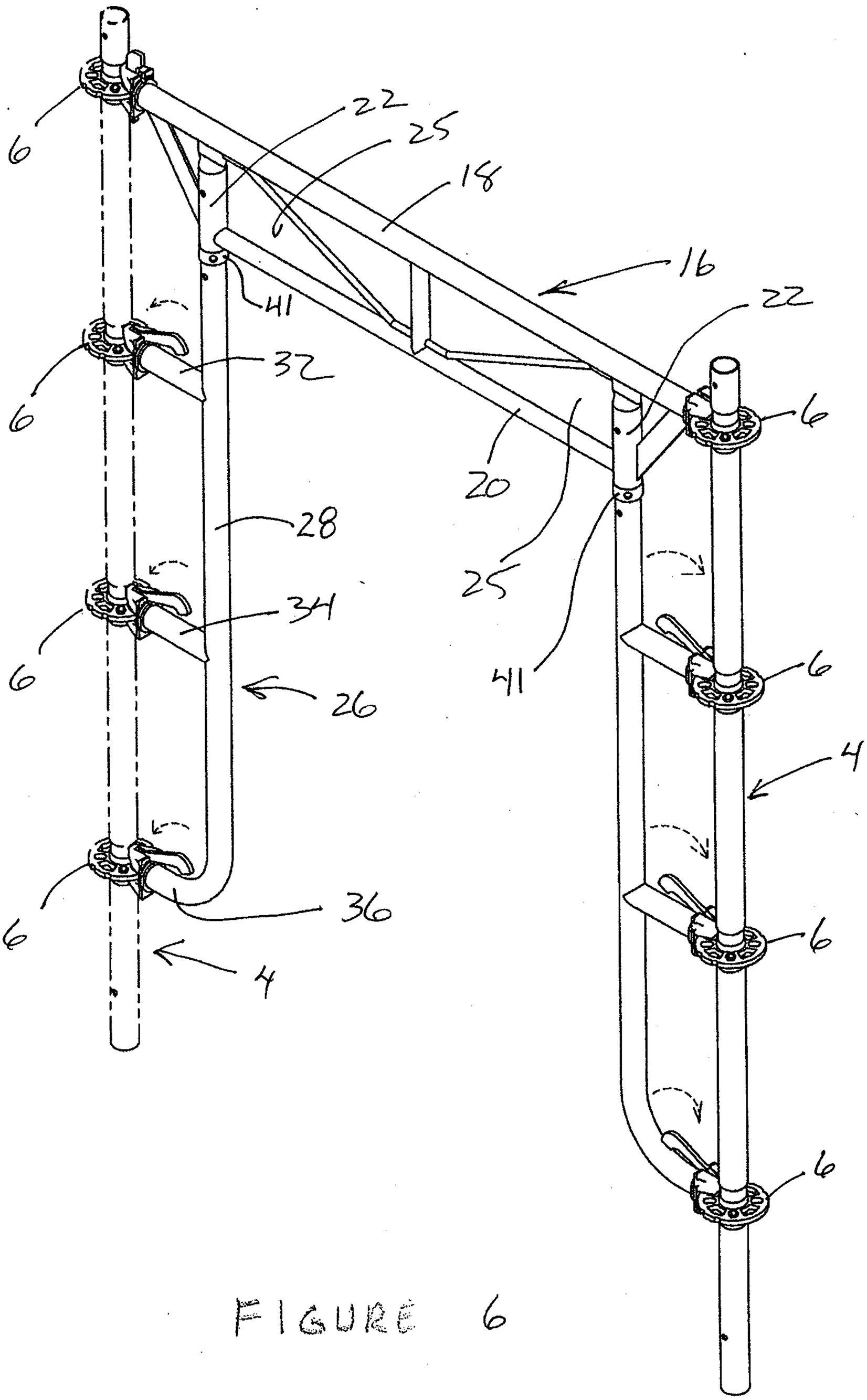


FIGURE 6

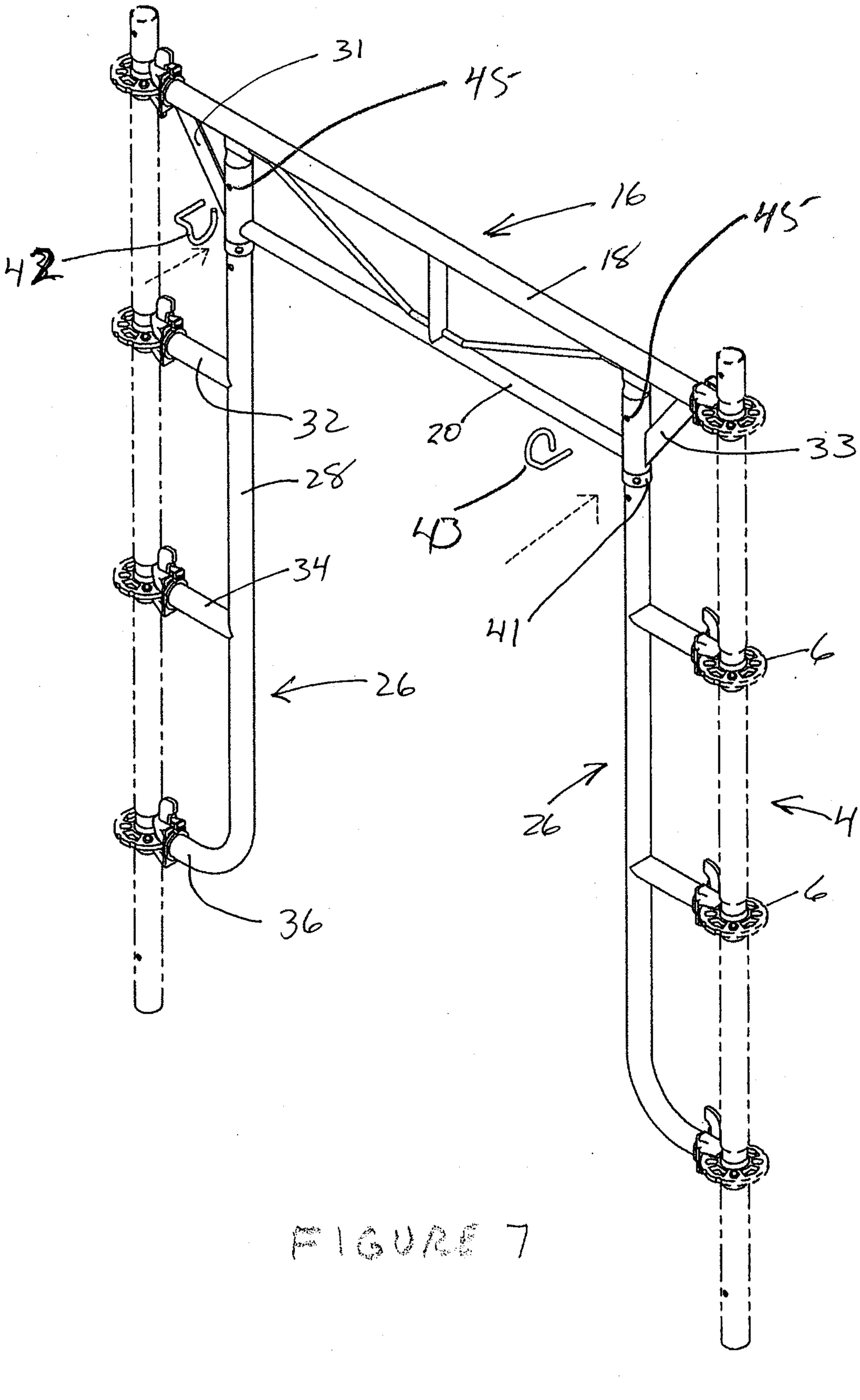
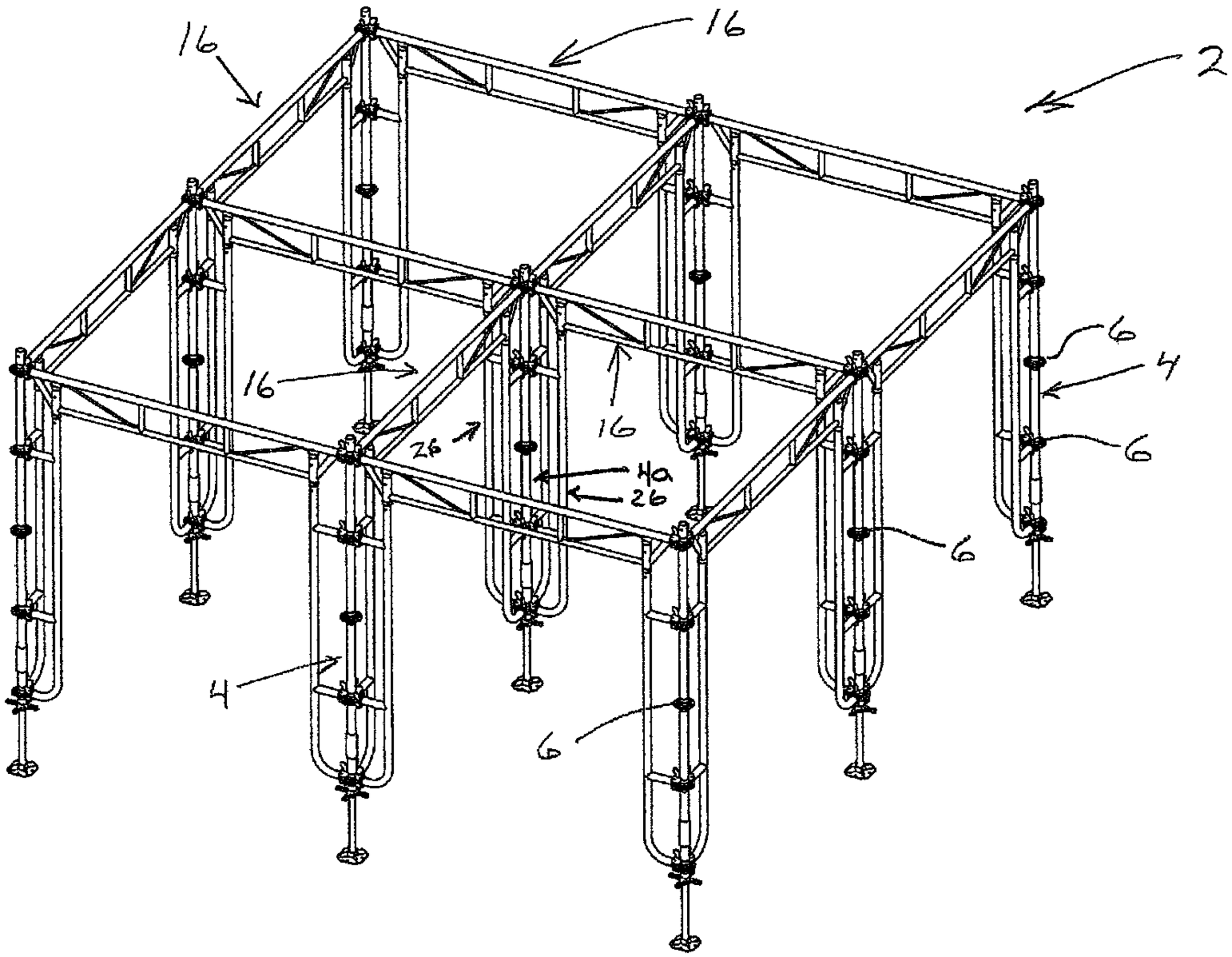


FIGURE 7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