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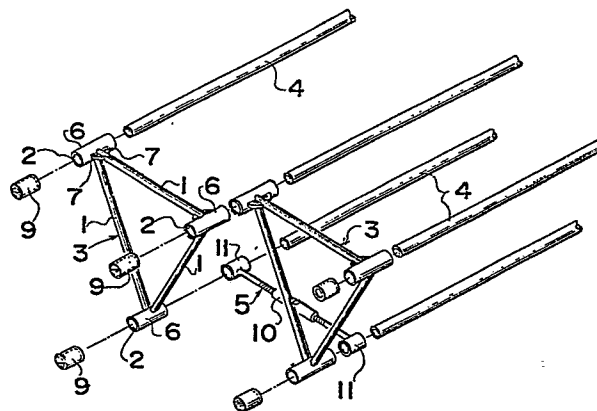
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54 **METHOD OF CONSTRUCTING SIMPLE BUILT-IN FRAMEWORK AND DEVICE THEREFOR.**

57 A method of constructing a simple framework by assembling a plurality of connecting members (4) composed of unit frames (3) formed of pipes in a triangular shape with inserting holes (2) provided at the respective corner portions thereof and pipes inserted into the holes (2), and a plurality of spacing control members (5) arranged between the connecting members (4) for controlling the spacing therebetween; and a device for constructing a simple framework consisting of the unit frames (3), connecting members (4) and spacing control members (5).



Technical Field

This invention relates to a method and device for economically and safely constructing simple assembly structures to be skeletons of such structures as factories, workshops, hothouses and bridges or to be footholds of various structures in conformity with sizes or shapes according to uses by using the same materials.

Background Technique

Skeletons of such structures as factories, workshops, hothouses and bridges have been heretofore constructed of steel bars and steel frames of different shapes and sizes prepared in conformity with the structures to be constructed.

Therefore, there have been defects that it is necessary and uneconomical to prepare steel bars and steel frames of different shapes and sizes in conformity with the sizes and kinds of the structures and trouble and skill are required for the construction.

Further, there has been a defect that, as air-conditioning devices, sprinklers and electric wirings have been formed quite separately from the skeletons of structures, trouble is required to set such devices.

In the present invention, the materials themselves of the constructed structure can be effectively utilized for such air-conditioning devices, sprinklers and electric wirings.

Further, in the conventional structure, as the foundation is formed on the ground and the upper parts are constructed in turn, there is a defect that, with the progress of the construction, the working field becomes upper or higher with a danger in the works.

In the present invention, the upper parts of a structure are constructed on the ground and are lifted

upward in turn by works on the ground to construct the structure. Thus the safety of the workers can be secured.

Also, the foothold of the structure can be easily elevated in conformity with the progress of the construction of the structure.

Disclosure of the Invention

In the method of constructing simple assembly structures of the present invention, unit frames in which pipes are made triangular and inserting holes are provided at the respective corners of the triangle are inverted, are arranged so as to be of a proper width at proper intervals and are parallelly provided so as to be of a proper length in the horizontal direction, the inserting holes at both end corners of the respective adjacent upper sides are aligned with each other, connecting members consisting of pipes are respectively inserted in the width direction through the aligned inserting holes, further connecting members consisting of pipes are also respectively inserted in the width direction through the inserting holes at the lower corners of the above mentioned unit frames, interval adjusting members are provided between the lower connecting members, the entire assembly is flattened, ridged or curved and the same unit frames, connecting members and interval adjusting members as are mentioned above are connected in the vertical direction below both ends of the entire assembly to form side pillar parts. The device particularly designed to use the above mentioned method comprises the unit frames, connecting members and interval adjusting members of the above mentioned formation.

Brief Description of the Drawings

Figure 1 is a perspective view of a device according to the present invention as disassembled.

Figure 2 is a perspective view showing the same as assembled.

Figures 3, 4, and 5 are elevations showing constructing processes.

Figures 6, 7 and 8 are elevations showing other constructing processes.

Figures 9, 10 and 11 are elevations showing still other embodiments.

Figure 12 is a perspective view of a device as disassembled showing another embodiment.

Figure 13 is a perspective view of a device as disassembled showing still another embodiment.

Figure 14 is an elevation of a simple structure using the device of Figure 3.

Best Form to Work the Invention

In order to more particularly explain the present invention, it shall be explained in the following with reference to the accompanying drawings.

Figure.1 shows a device for using the method of the present invention.

The device of the present invention comprises unit frames 3 in which pipes 3 are made triangular and inserting holes 2 are provided at the respective corners of the triangle, connecting members 4 consisting of pipes to be inserted respectively through the above mentioned inserting holes 2 and interval adjusting members 5 to be provided between the connecting members 4 in proper positions.

First, the unit frames 3 shall be described. Pipe-shaped inserting parts 6 are welded to the respective corners of the triangular pipes 1 so as to intersect at right angles with the pipes 1 and the interiors of the pipe-shaped inserting parts 6 are made inserting holes 2.

By the way, in the case of the illustrated embodiment, brackets 7 are welded to the welded portions of

the pipes 1 and pipe-shaped inserting parts 6 and, as shown in Figure 2, reinforcing members 8 can be fitted between the brackets 7 in the formation.

Now, the connecting members 4 shall be described. The connecting members 4 are formed of pipes of diameters inserted respectively through the inserting holes 2 of the above mentioned unit frames 3 and are further fitted with caps 9 at the ends as required.

The interval adjusting members 5 shall be described. In the case of the illustrated embodiment, so-called turn-buckles 10 are used and pipe-shaped insertings parts 11 through which the above mentioned connecting members 4 are to be inserted are welded to both ends of the turn-buckles 10.

Figures 3, 4 and 5 show a constructing method of the present invention.

That is to say, the unit frames 3 of the above mentioned formations are inverted, are arranged so as to be of a predetermined width X at proper intervals and are parallelly provided so as to be of a proper length Y in the horizontal direction, the inserting holes 2 at both end corners of the respective adjacent upper sides are aligned with each other and the connecting members 4 are respectively inserted through the aligned inserting holes 2. As a result, all the inserting holes 2a at the lower corners of the unit frames are also arranged in the same positions in the width direction.

Then, the connecting members 4a are inserted respectively through the inserting holes 2a at the lower corners. In the present invention, the interval adjusting members 5 are arranged between the lower corners of the unit frames 3, the connecting members 4a are inserted in turn respectively through the inserting holes 2a at the lower corners of the unit frames 3 and the pipe-shaped inserting parts 11 at both ends of the interval adjusting members 5. Therefore, if the interval

adjusting members 5 are adjusted, the upper surfaces of the parallelly provided unit frames 3, will be able to be flattened, ridged or curved.

Needless to say, in the illustration in Figure 3, the upper surfaces are flat and, in this case, the interval adjusting members 5 may be of predetermined lengths having no adjusting mechanism. Then, below both ends of the assembly, the same unit frames 3a, connecting members 4b and interval adjusting members 5a are connected in the vertical direction to form side pillars.

That is to say, as shown in Figures 3 and 4, the above mentioned flatly formed assembly is lifted by using jacks 12. In the vertical direction at both ends of the assembly, the unit frames 3a are connected by using the connecting members 4b and interval adjusting members 5a to be side pillars. When a required height is reached, the side pillars may be perfectly fixed at the lower ends to concrete bases 13.

Then, roof plates are fitted to the upper surface of the flatly formed assembly, wall plates are fitted to the outsides of the pillars, further the opened front and rear portions are closed as required and a required inlet and outlet may be provided.

Figures 6 to 8 and 9 to 11 show methods of constructing arched simple assembly structures by using the device of the present invention.

First, Figures 6 to 8 shall be explained. The unit frames 3b as set horizontally are arranged to be of a predetermined width at proper intervals, the connecting member 4c is inserted through the inserting hole at the corner positioned on the lower outside of the assembly, the connecting member 4d is inserted through the interval adjusting members 5b between the unit frames 3b as in the embodiment through the inserting hole at the corner positioned on the lower inside of the assembly, the through holes at the outside and inside corners positioned below

and the connecting members 4c and 4d inserted therethrough are fixed to a concrete base 13a formed in advance and then, above them, the unit frames 3c are connected in turn through connecting members 4e. In such case the intervals of the interval adjusting members 5b located inside are adjusted so that the entire assembly may be arched.

By the way, in the drawings, 12a is a jack which supports the constructed assembly in connecting the unit frames 3b and 3c and will become unnecessary when the entire assembly is arched and is fixed also at the other end to the concrete foundation 13b. When the entire assembly is arched as in Figure 8, it will well endure a load. Then, roof plates are fitted to the upper surface of the assembly, the opened front and rear portions are closed as required and an inlet and outlet may be provided.

Now, Figures 9 to 11 shall be described. In this embodiment, pipes 14 of a proper length which are also stoppers are used as lower interval adjusting members of the unit frames 3d and are arranged between the connecting members 4f in the portions requiring the adjustment of the intervals, wires 15 are respectively inserted through the connecting members 4f and pipes 14 so that, when the wires 15 are pulled, the intervals between the connecting members 4f in the portions requiring the adjustment of the intervals will be reduced and the entire assembly will be formed to be arched.

That is to say, as shown in Figure 9, the connecting members 4f requiring the adjustment of the intervals are respectively provided with holes 16 through which the wires 15 are respectively inserted, the wires 15 are respectively inserted in turn through the holes 16 of the connecting members 4f and the pipes 14 and the same connecting members 4g as in the above mentioned embodiment are respectively inserted through the inserting

holes 2 at the corners at both ends of the upper side to form such assembly as in Figures 9 and 10 on the ground. When the wires 15 are fixed at one end and are pulled at the other end, the intervals between the lower connecting members 4f will be reduced to the length of the pipes 14 adjusted in advance to arch the assembly. Then the assembly is lifted with a jack or the like not illustrated and concrete foundations 13c may be provided below both ends of the assembly to fix the assembly.

Needless to say, the concrete foundations 13c may be formed in advance.

By the way, fitting the roof plates and others is the same as in the above mentioned embodiment.

Figures 12 and 13 show other embodiments of the device. The unit frame 3f shown in Figure 12 is based on the form connecting two unit frames 3 shown in Figure 1 and has a connecting pipe 17 welded below and inserting holes 2b of connecting members 4h provided at the respective corners.

Further, the unit frame 3e shown in Figure 13 is based on the form connecting three unit frames 3 shown in Figure 1 and has connecting pipes 17a and 17b welded below and inserting holes 2c of connecting members 4h provided at the respective corners.

Further, Figure 14 shows an embodiment in which a ridged simple roof assembly structure is constructed by using the above mentioned unit frames 3f and 3e. It is needless to say that the same simple assembly structure can be constructed with the device shown in Figure 1.

That is to say, the inverted unit frames 3f are interposed respectively between the unit frames 3e to provide an assembly symmetrical on the right and left, the respective inserting holes 2c and 2b are aligned with each other, the connecting members 4h are respectively inserted through the aligned holes 2c and 2b, the interval adjusting members 5c are respectively provided

between the connecting members 4h inserted through the inserting holes 2c and 2b below the middle portion of the assembly, the respective intervals between the connecting members 4h are reduced to ridge the assembly, then the assembly is lifted with jacks 12b, the same unit frames 3f or 3e are connected in the vertical direction by using the connecting members 4h and interval adjusting members 5c below both ends of the assembly to form side pillars and the side pillars may be properly fixed at the lower ends to concrete bases 13d.

By the way, according to the device of the present invention, the shapes of roofs can be not only flattened, ridged and arched but also made in any other forms.

Utilizability in the Industry

As in the above, in the present invention, if the unit frames, connecting members and interval adjusting members are mass-produced, simple assembly structures of sizes or shapes adapted to uses will be able to be thereby easily provided. It is very advantageous. Further, as the connecting members are pipes, they can be utilized as cool or warm air feeding paths for air-conditioning devices, water feeding paths for sprinklers or electric wiring pipes. In such case, unnecessary parts may be closed or through holes may be made in necessary parts to make the utilization easy.

Further, as required, not only the connecting members but also the unit frames can be utilized in the same manner. The connecting members can be made to communicate with the hollow parts of the unit frames.

The constructing works can be made solely on the ground, the elevated works are eliminated, the safety of the works can be secured and the utilizability in the industry is very high.

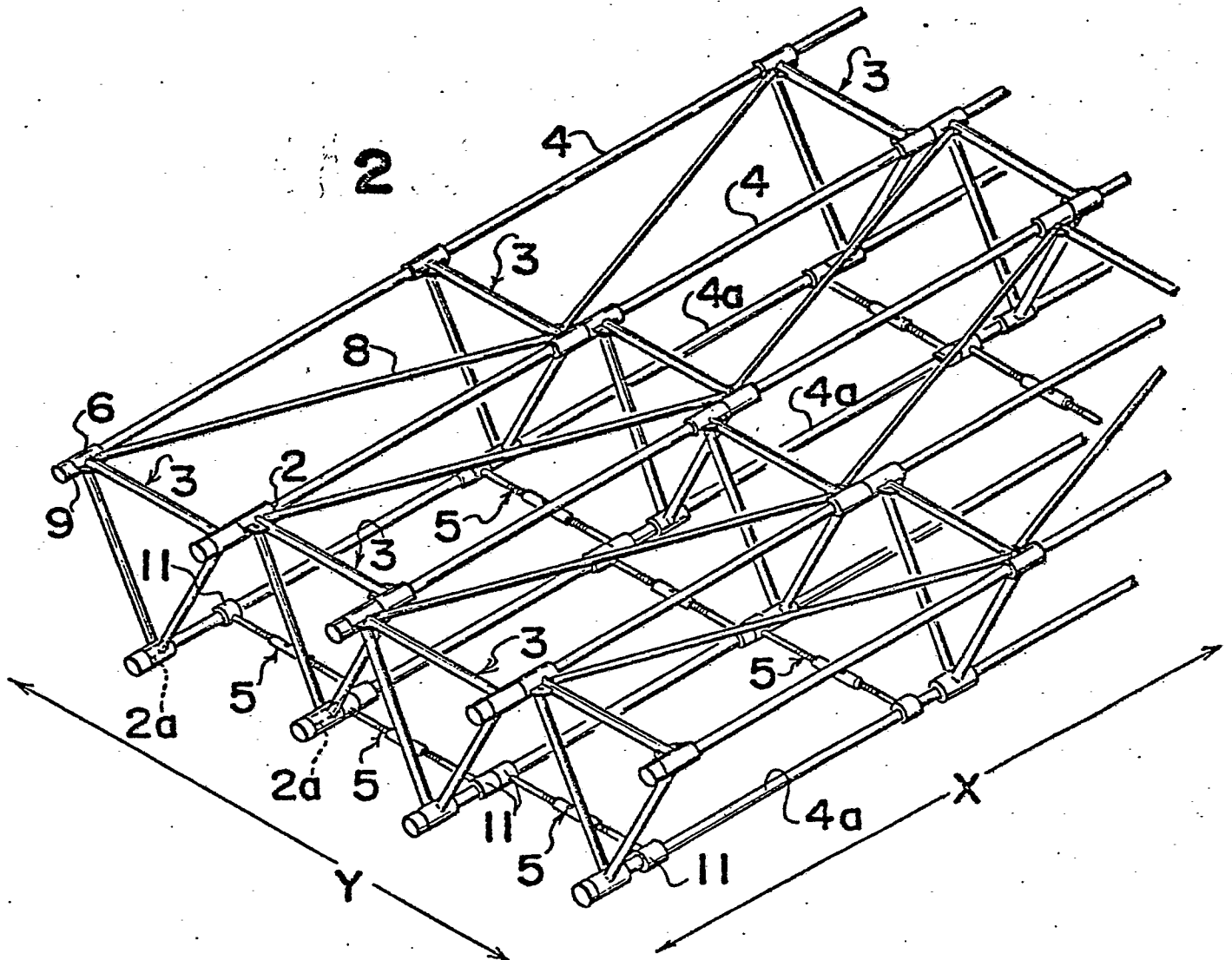
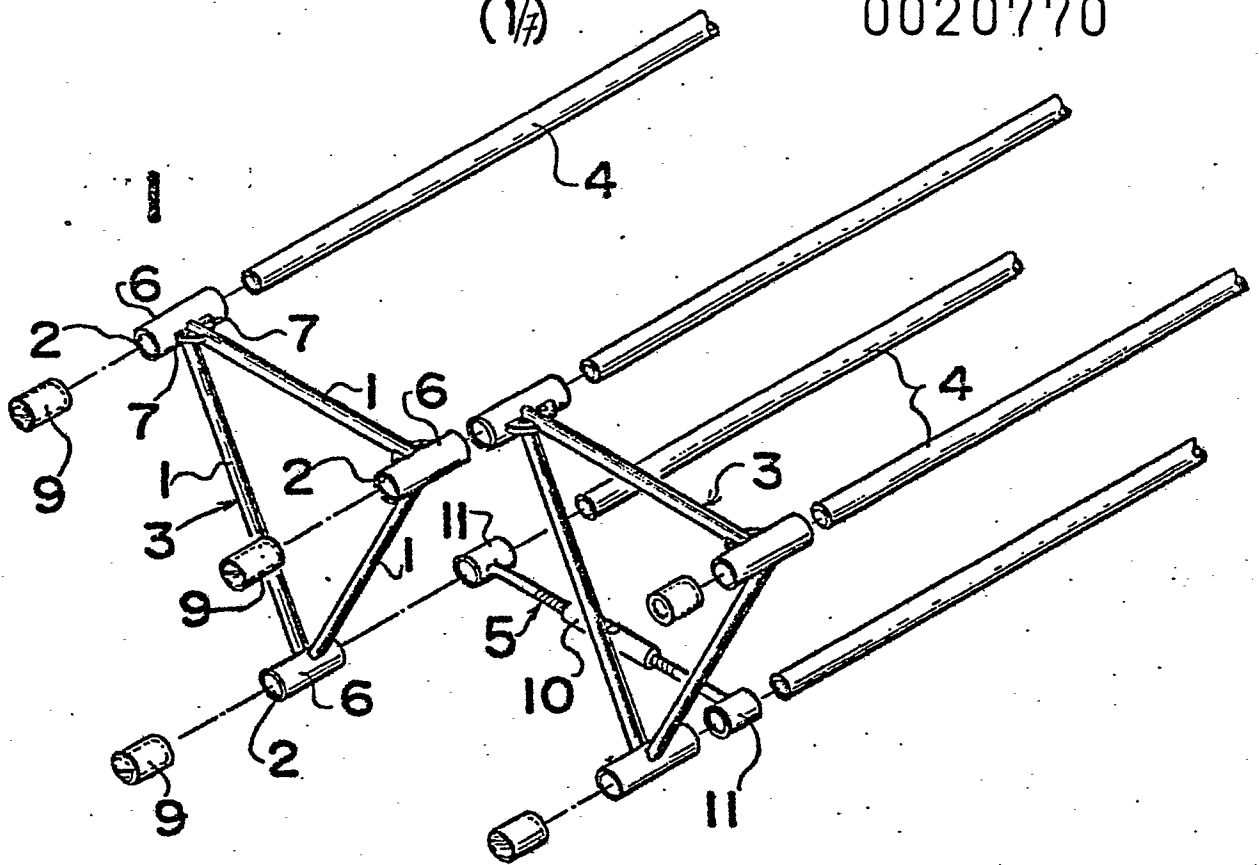
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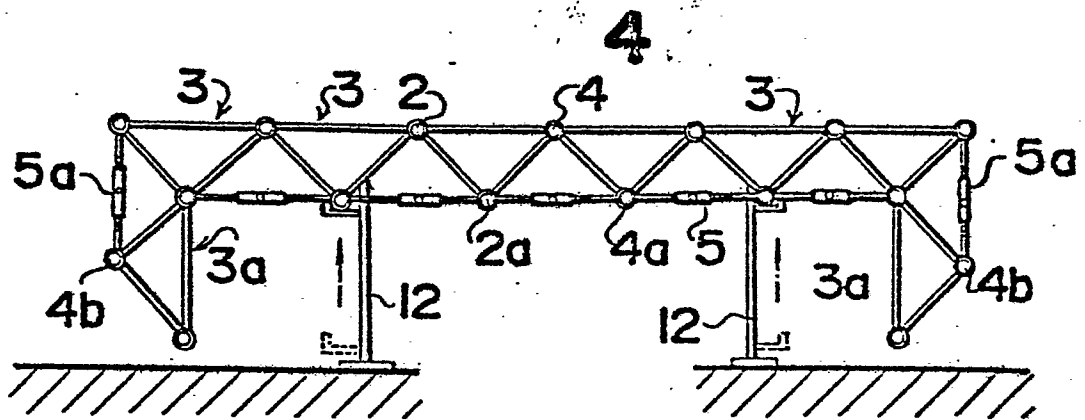
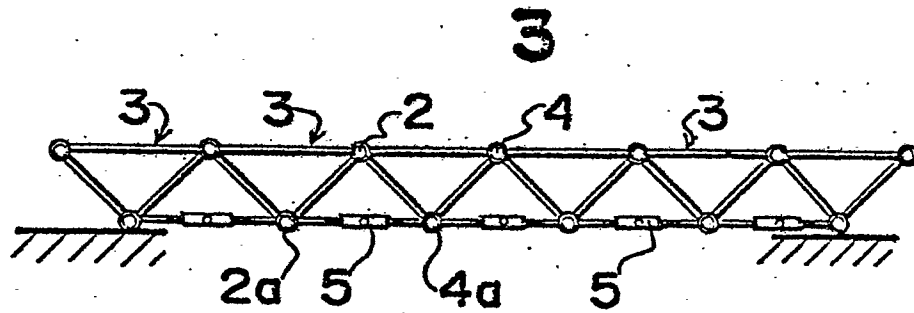
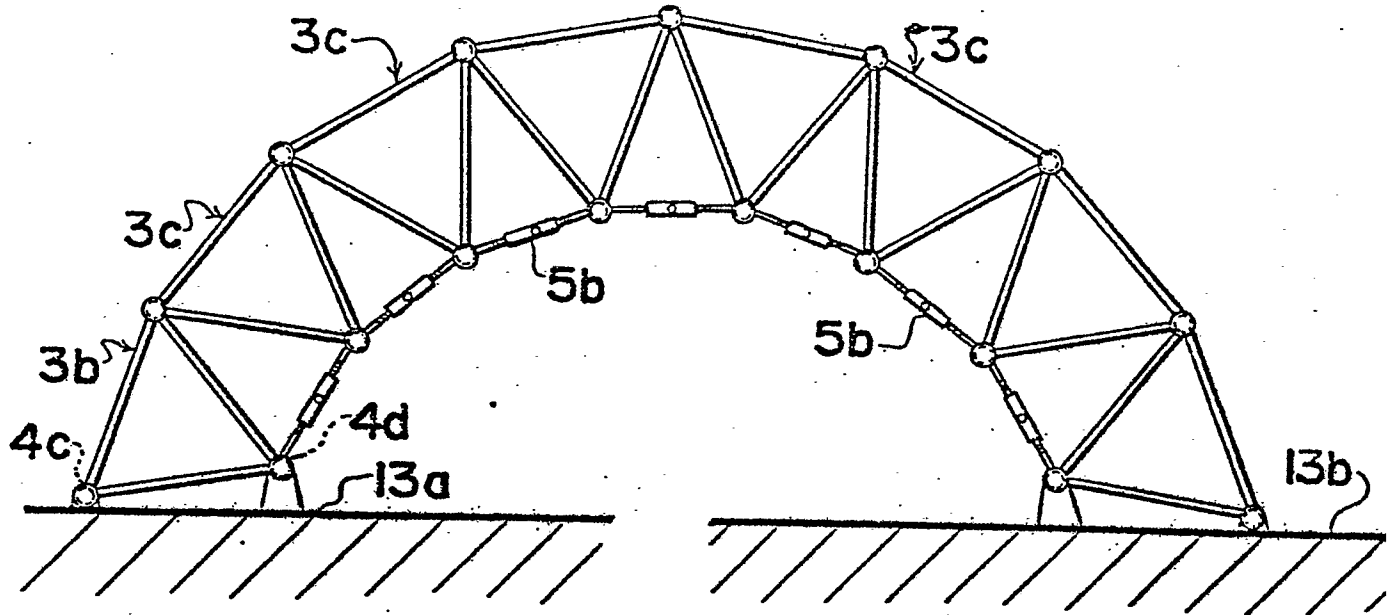
1. A method of constructing simple assembly structures characterized in that unit frames in which pipes are made triangular and inserting holes are provided at the respective corners of the triangle are inverted, are arranged so as to be of a proper width at proper intervals and are parallelly provided so as to be of a proper length in the horizontal direction, the inserting holes at both end corners of the respective adjacent upper sides are aligned with each other, connecting members consisting of pipes are respectively inserted in the width direction through the aligned inserting holes, further connecting members consisting of pipes are also respectively inserted in the width direction through the inserting holes at the lower corners of the above mentioned unit frames, interval adjusting members are provided between the lower connecting members, the entire assembly is flattened, ridged or curved and the same unit frames, connecting members and interval adjusting members as are mentioned above are connected in the vertical direction below both ends of the entire assembly to form side pillar parts.

2. A device for constructing simple assembly structures comprising unit frames in which pipes are made triangular and inserting holes are provided at the respective corners of the triangle, connecting members consisting of pipes having diameters to be inserted respectively through said inserting holes and interval adjusting members to be provided between the separated connecting members.

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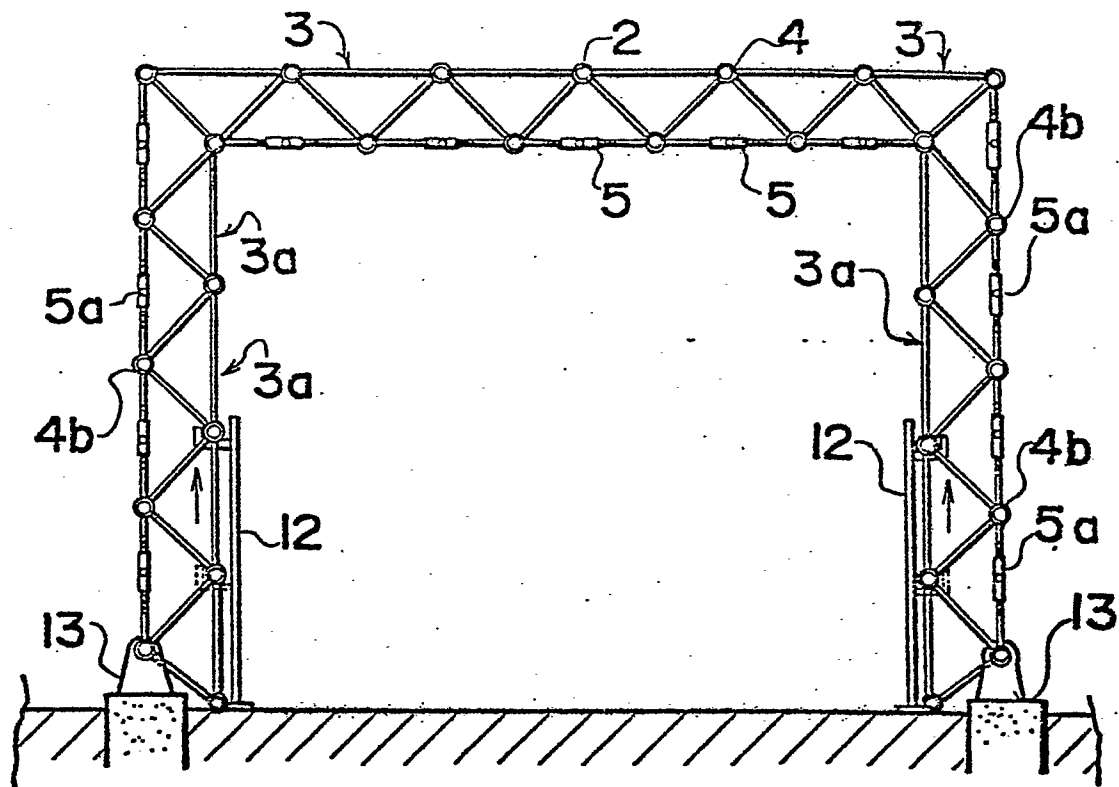




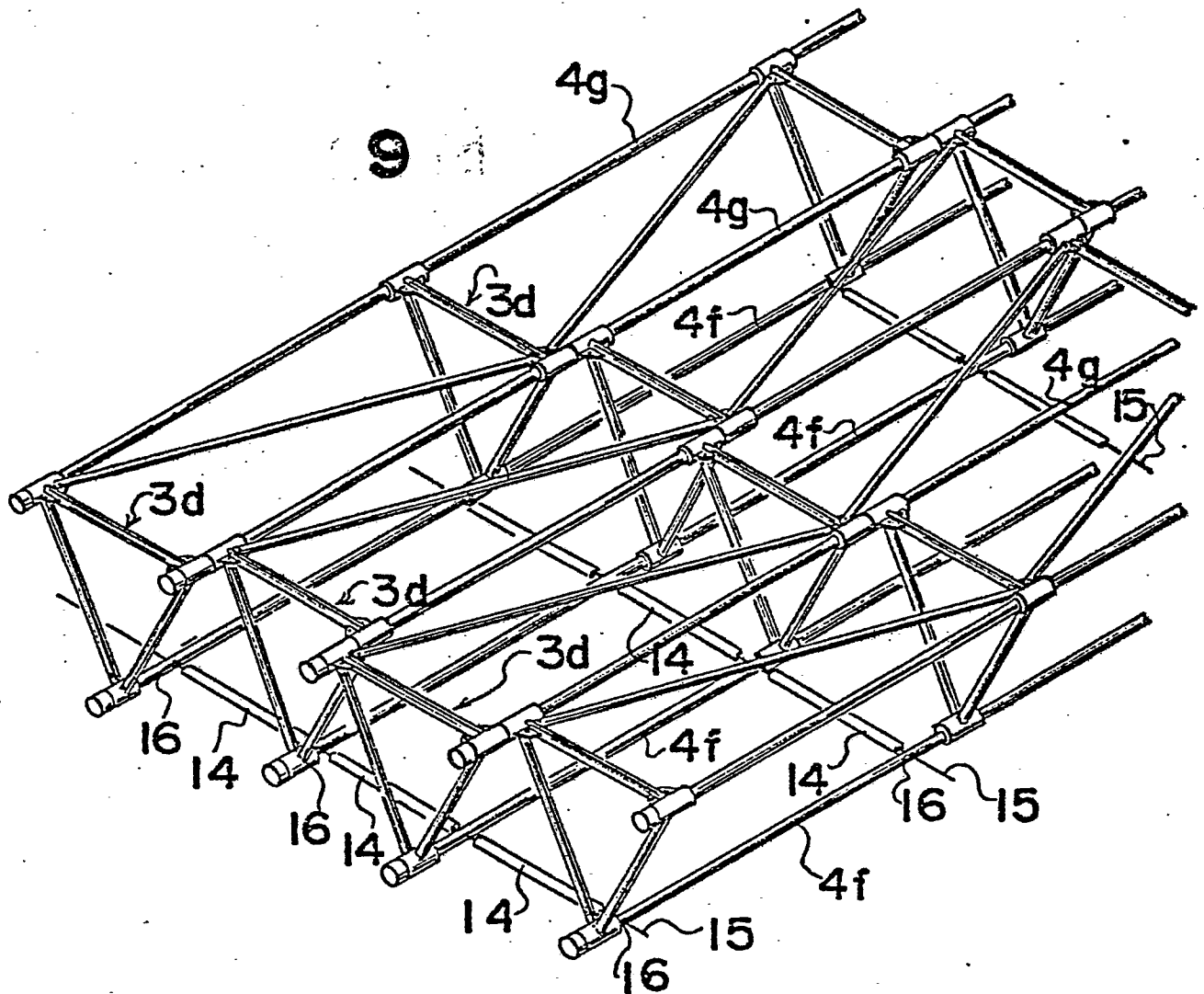
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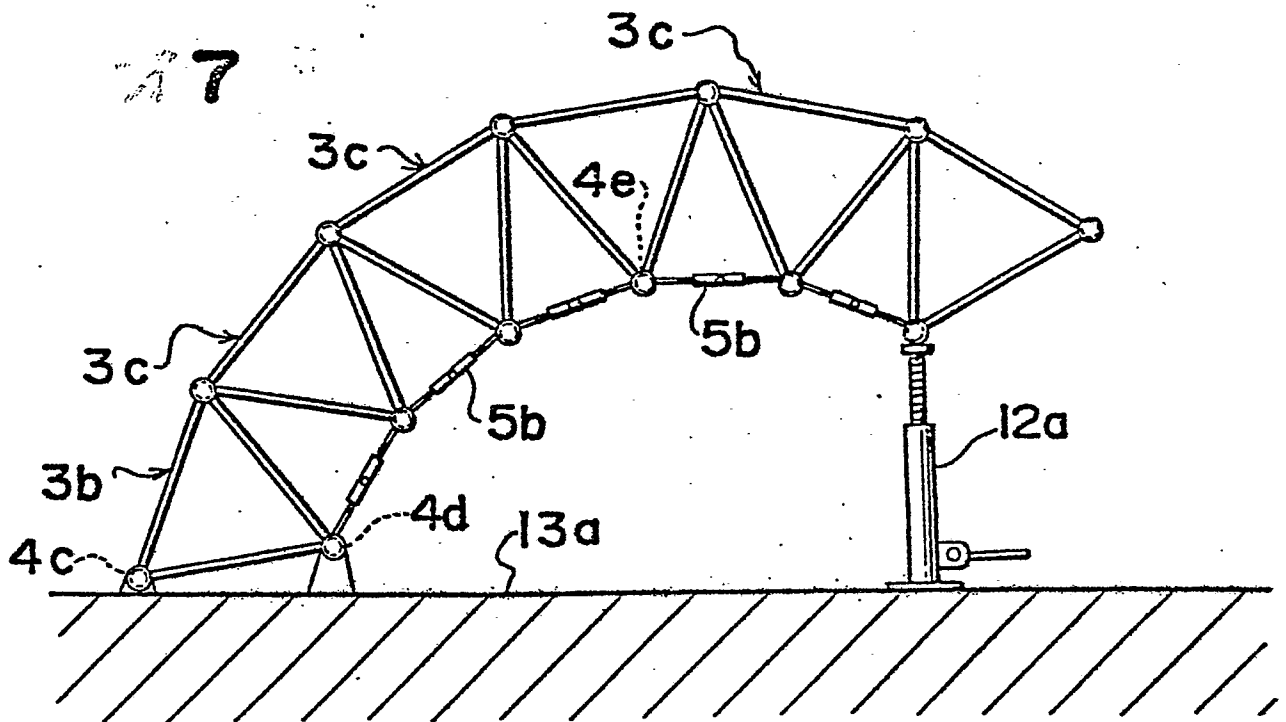
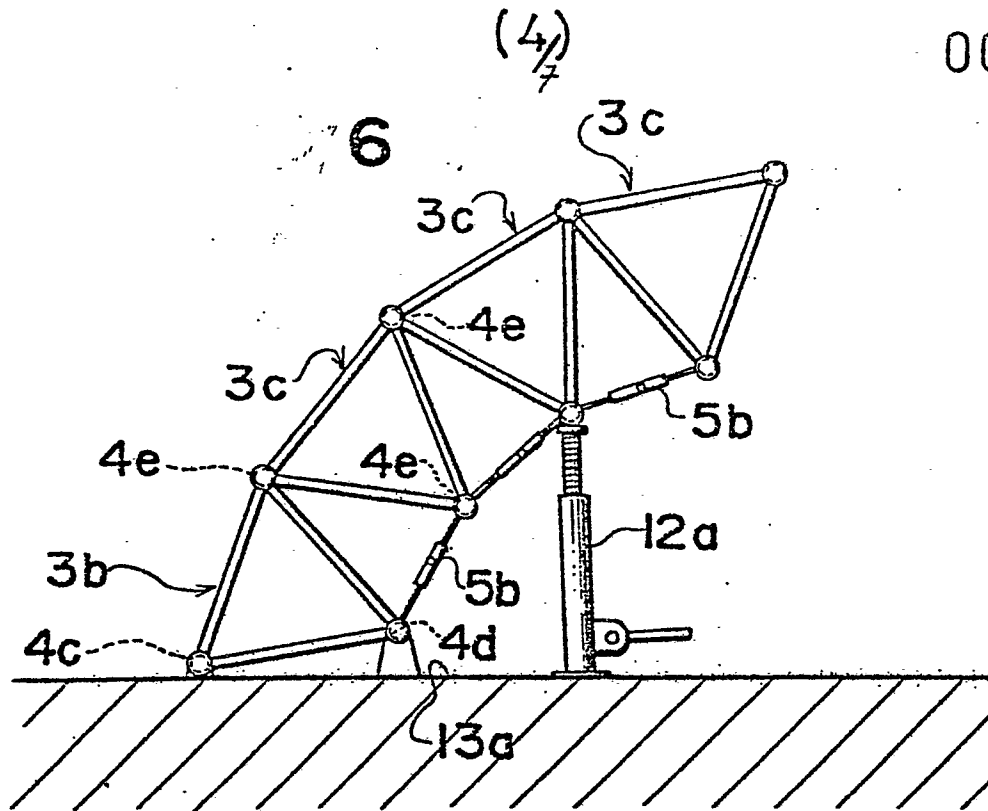
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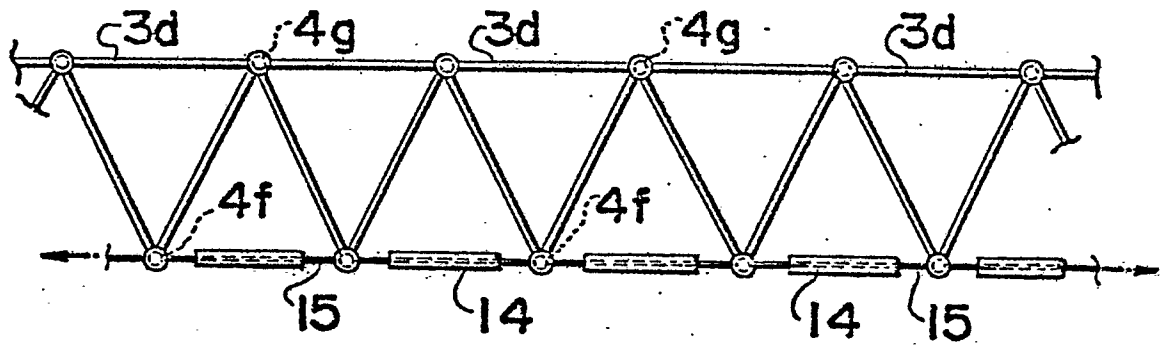
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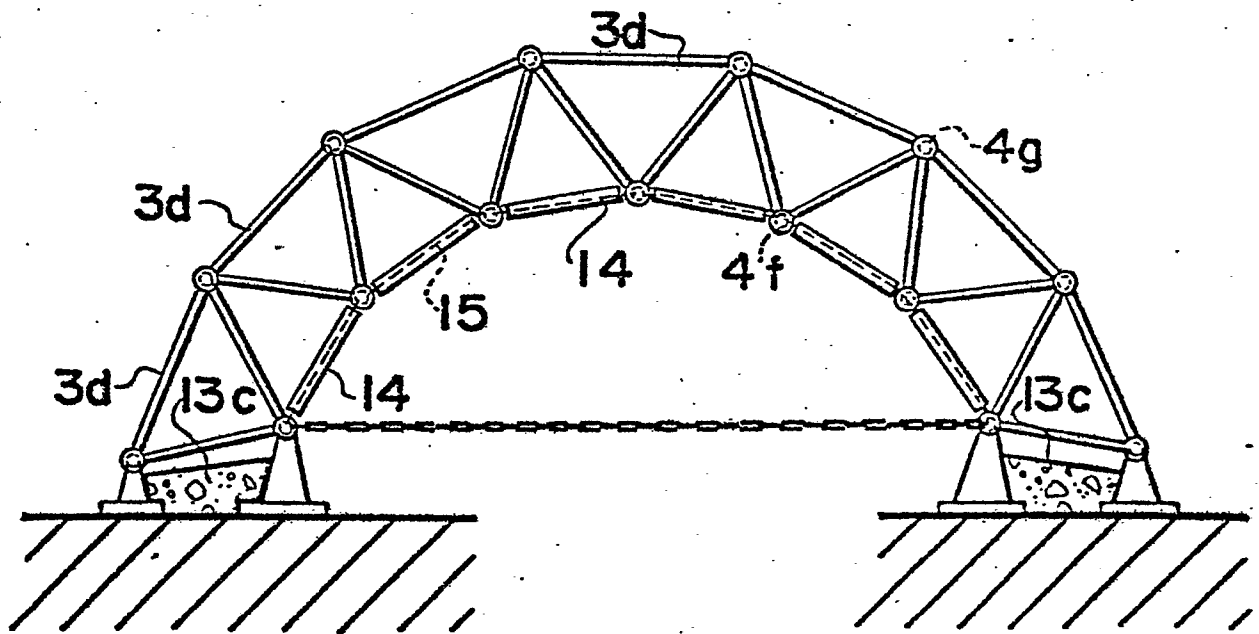


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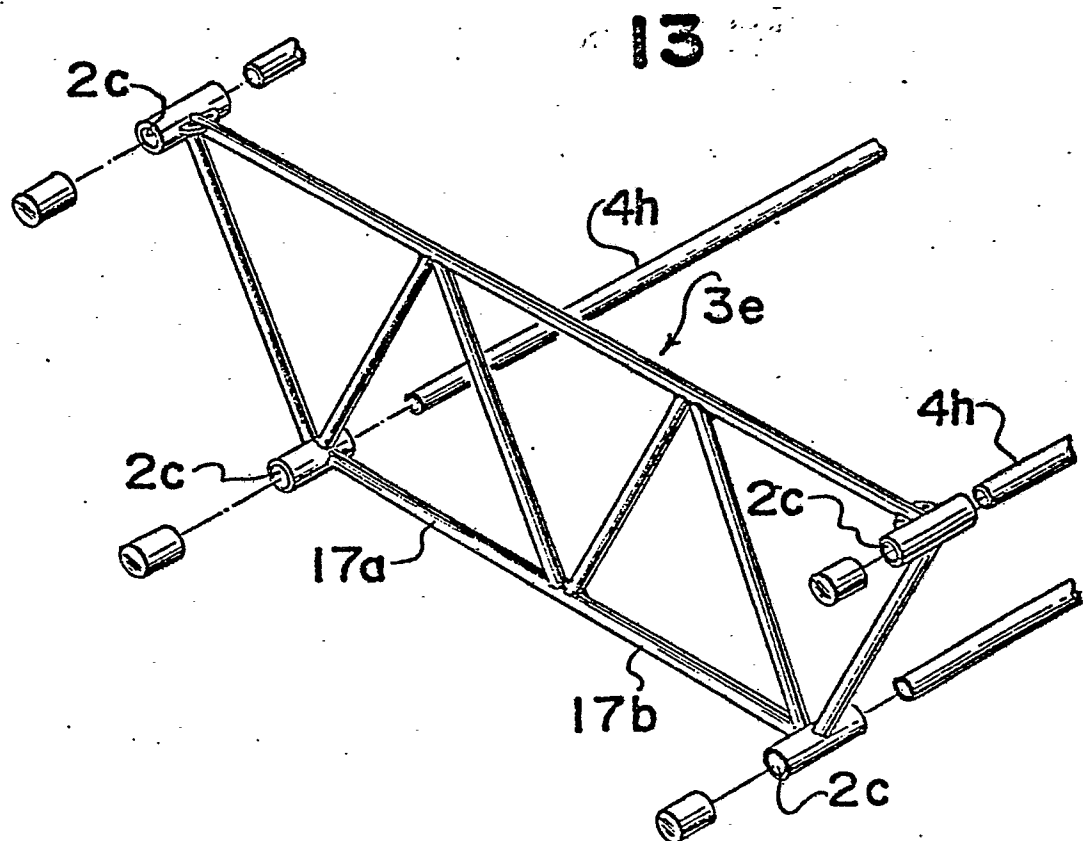
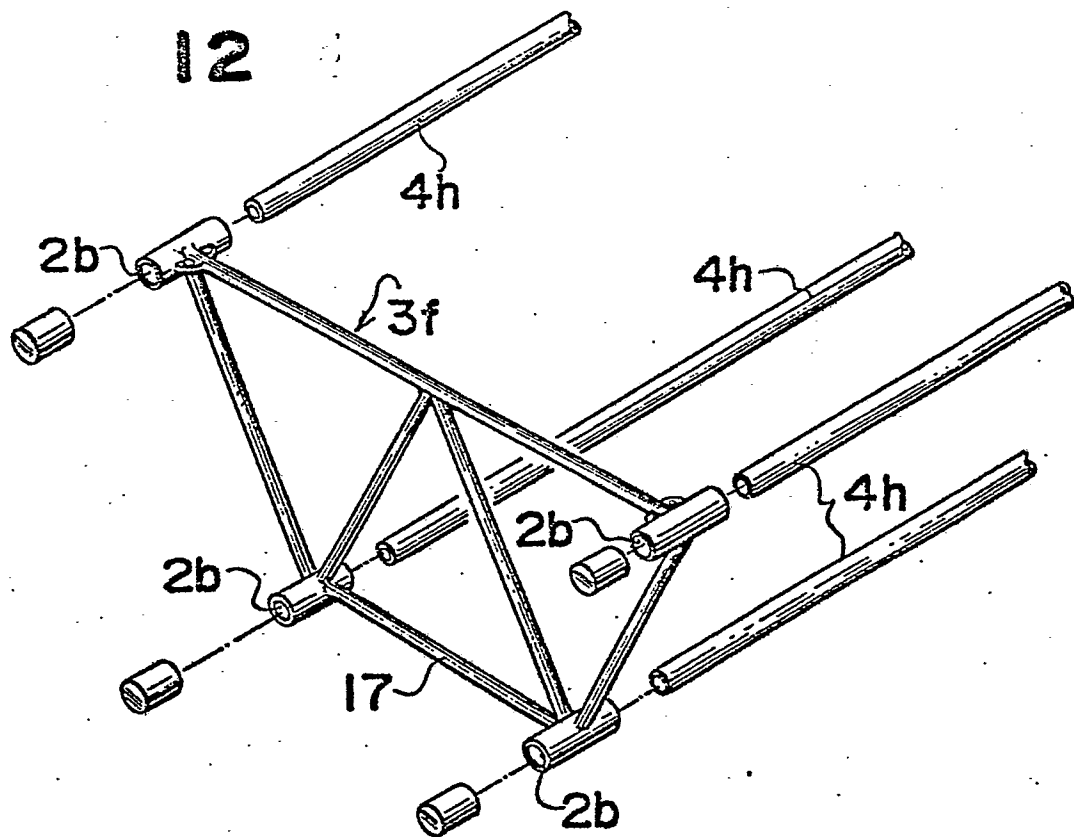
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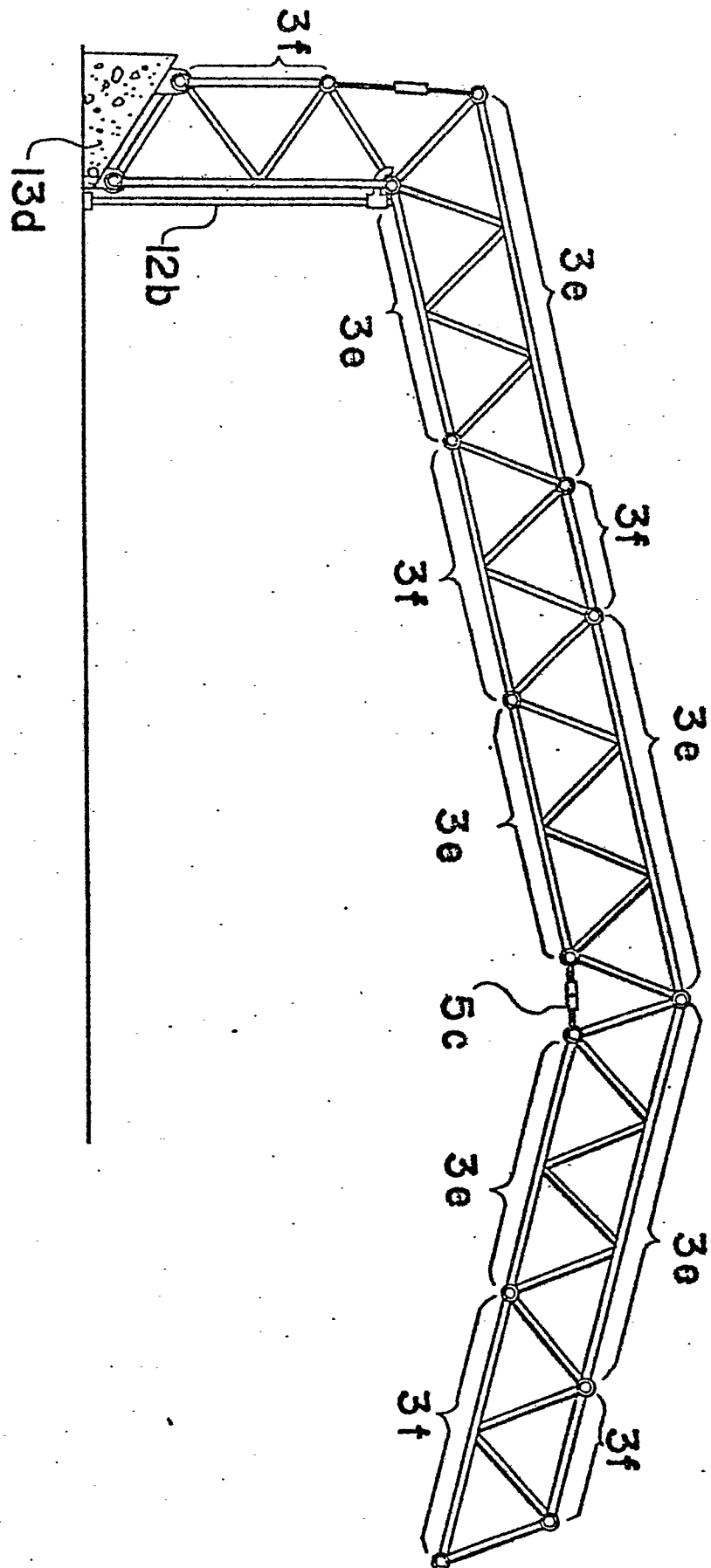
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INTERNATIONAL SEARCH REPORT

International Application No PCT/JP79/00240

I. CLASSIFICATION OF SUBJECT MATTER (if several classification symbols apply, indicate all) ³ According to International Patent Classification (IPC) or to both National Classification and IPC		
E04B 1/342		0020770
II. FIELDS SEARCHED		
Minimum Documentation Searched ⁴		
Classification System	Classification Symbols	
I P C	E04B 1/342, E04B 1/32, E04B 1/343, E04B 1/348	
Documentation Searched other than Minimum Documentation to the Extent that such Documents are Included in the Fields Searched ⁵		
Jitsuyo Shinan Koho 1926-1979 Kokai Jitsuyo Shinan Koho 1971-1979		
III. DOCUMENTS CONSIDERED TO BE RELEVANT ¹⁴		
Category ⁶	Citation of Document ¹² with indication, where appropriate, of the relevant passages ¹³	Relevant to Claim No. ¹⁵
A	JP, Y1, 38-10344, 1963-5-29	1. 2
A	JP, B1, 47-44692, 1972-11-11	1. 2
A	JP, B2, 52-46413, 1977-11-24	1. 2
A	JP, B1, 11-2810, 1936-7-13	1. 2
A	JP, Y1, 37-9637, 1962-5-10	1. 2
A	JP, B1, 29-4527, 1954-7-22	1. 2
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IV. CERTIFICATION		
Date of the Actual Completion of the International Search ⁷		Date of Mailing of this International Search Report ⁸
December 5, 1979 (05.12.79)		December 10, 1979 (10.12.79)
International Searching Authority ⁹		Signature of Authorized Officer ¹⁰
Japanese Patent Office		