

[54] **FIXTURE FOR HEAT TREATING FURNACES**
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[52] U.S. Cl..... 211/177, 211/182, 263/47 R,
 287/54 A
 [51] Int. Cl..... A47f 5/10, F16b 7/00
 [58] Field of Search 211/177, 182, 13,
 211/134; 263/47 R, 47 A; 266/5 R, 20;
 287/54 A, 54 B, 54 C; 182/179

[57] **ABSTRACT**

A fixture for heat treating furnaces is disclosed having a frame composed of horizontal round rods and horizontal rectangular bars and vertical rods with vertical tubular connector units having transverse slots through which the horizontal bars extend and openings normal to the bars through which the horizontal rods extend, the vertical rods being slotted at their ends to engage the horizontal bars. Wires are employed to hold the structure in assembled relation. Horizontally disposed work piece racks are supported by the horizontal bars. The components of the frames and racks are preferably of low specific heat material, and preferably of molybdenum but may be of tungsten, tantalum, columbium and their alloys, or of graphite.

[56] **References Cited**
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8 Claims, 6 Drawing Figures

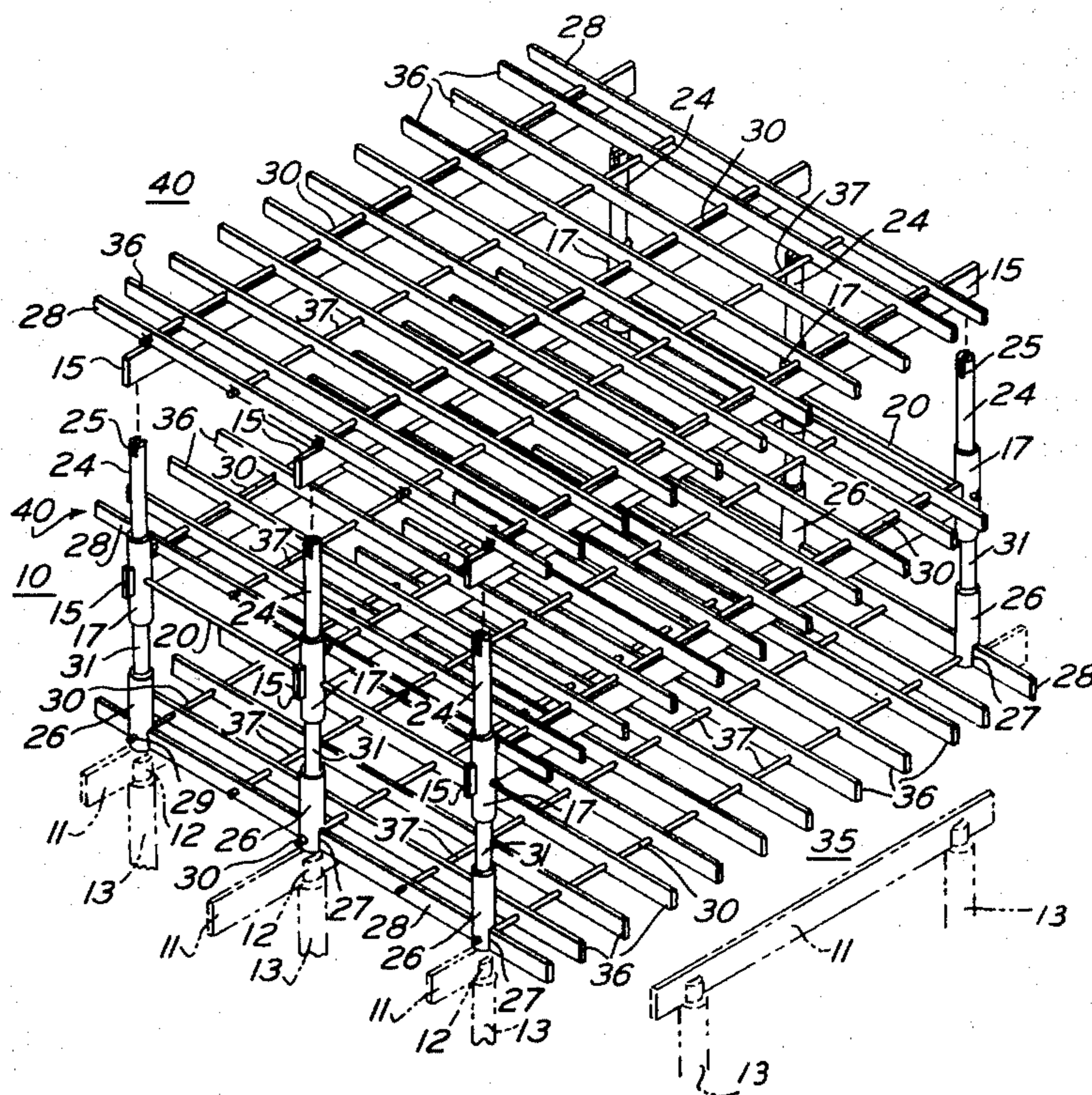


FIG. 1

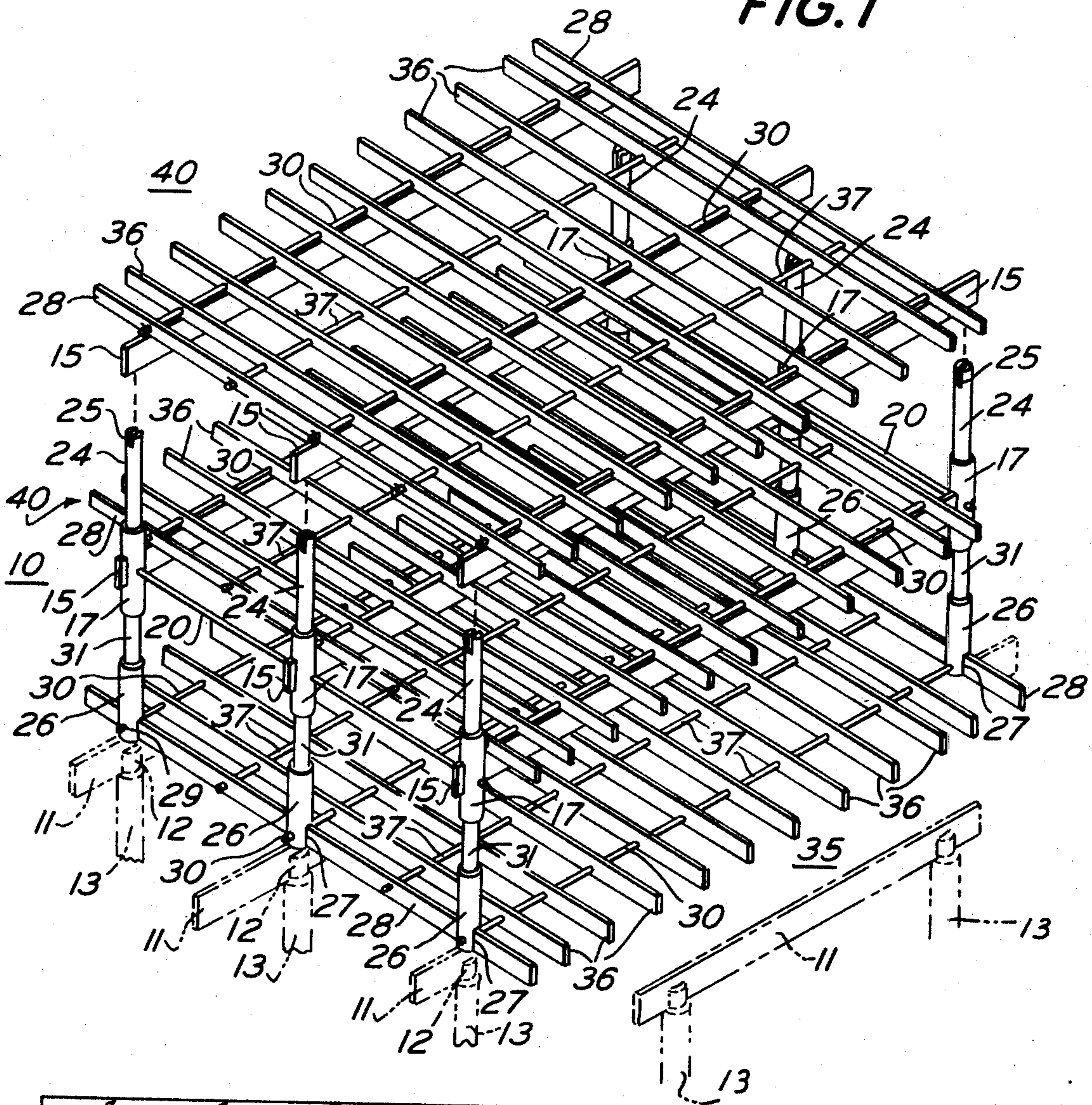
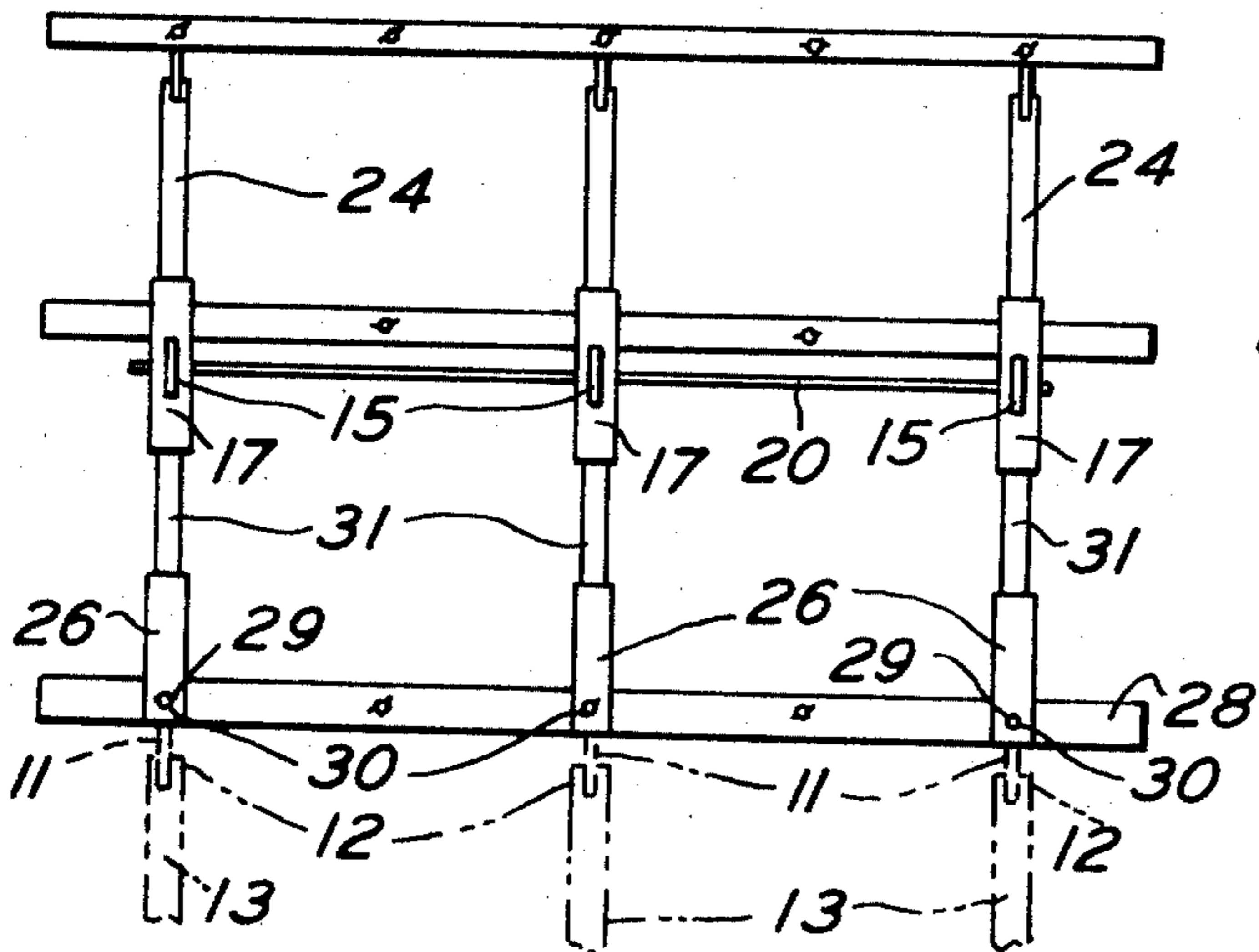


FIG. 2



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FIG. 3

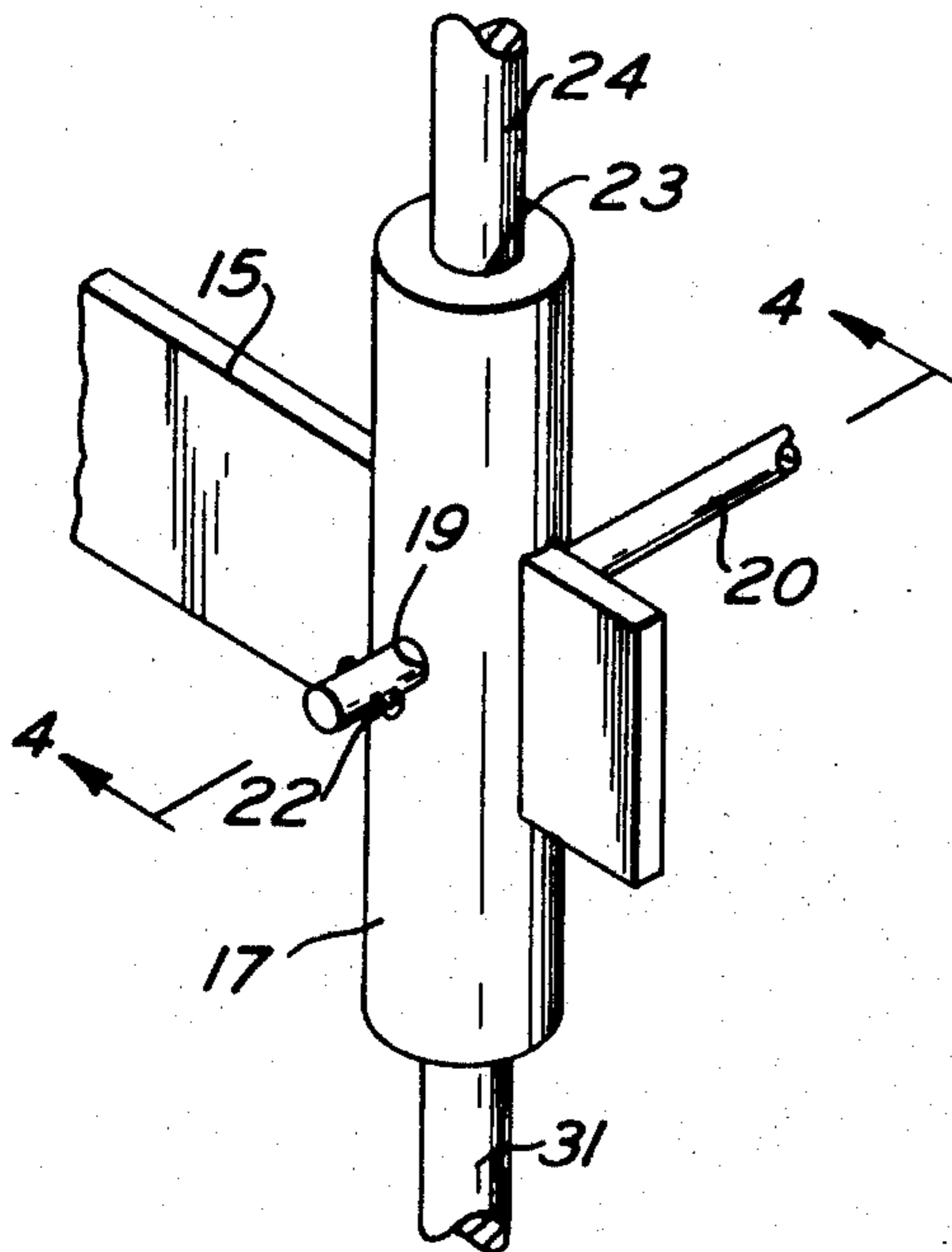


FIG. 4

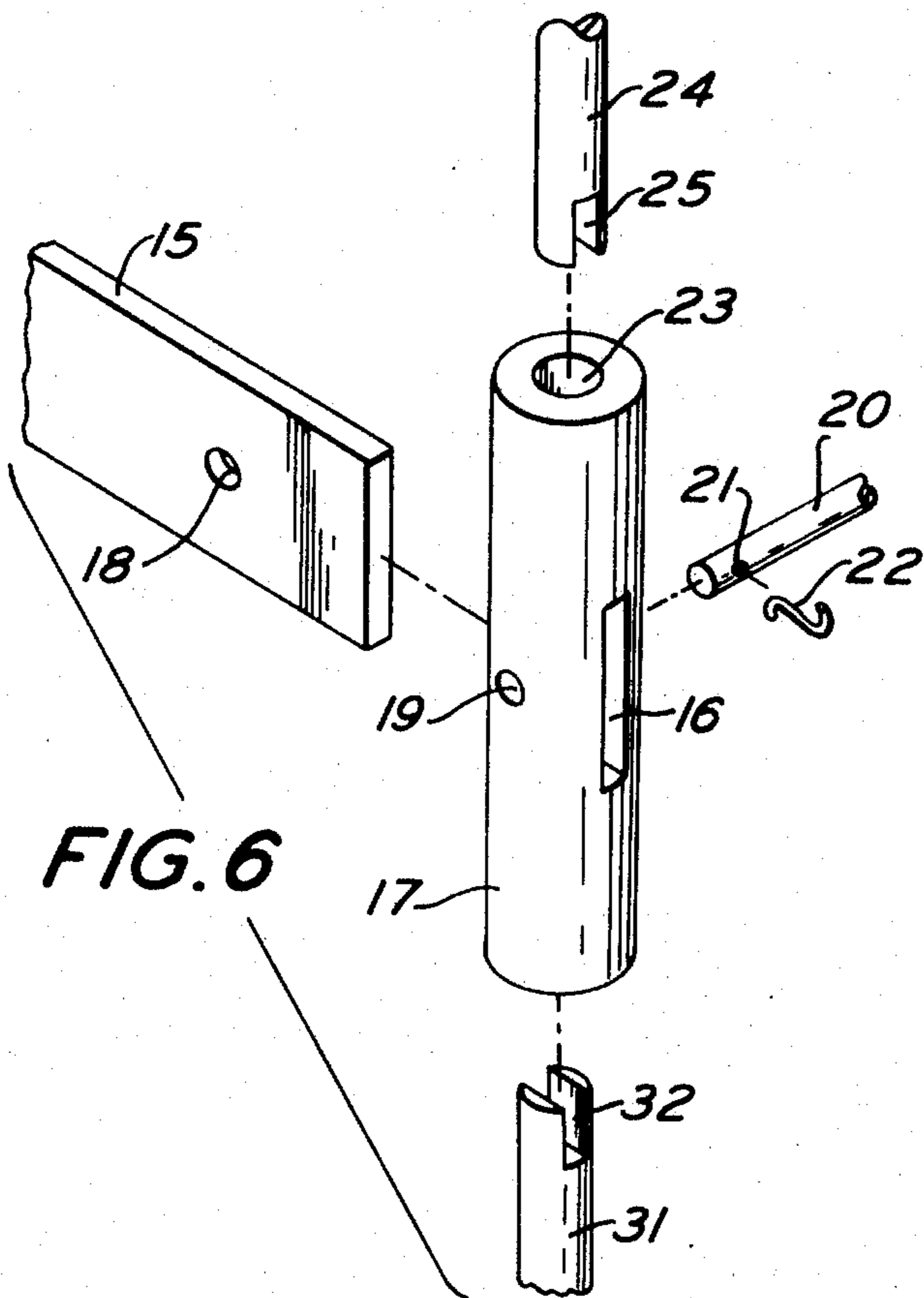
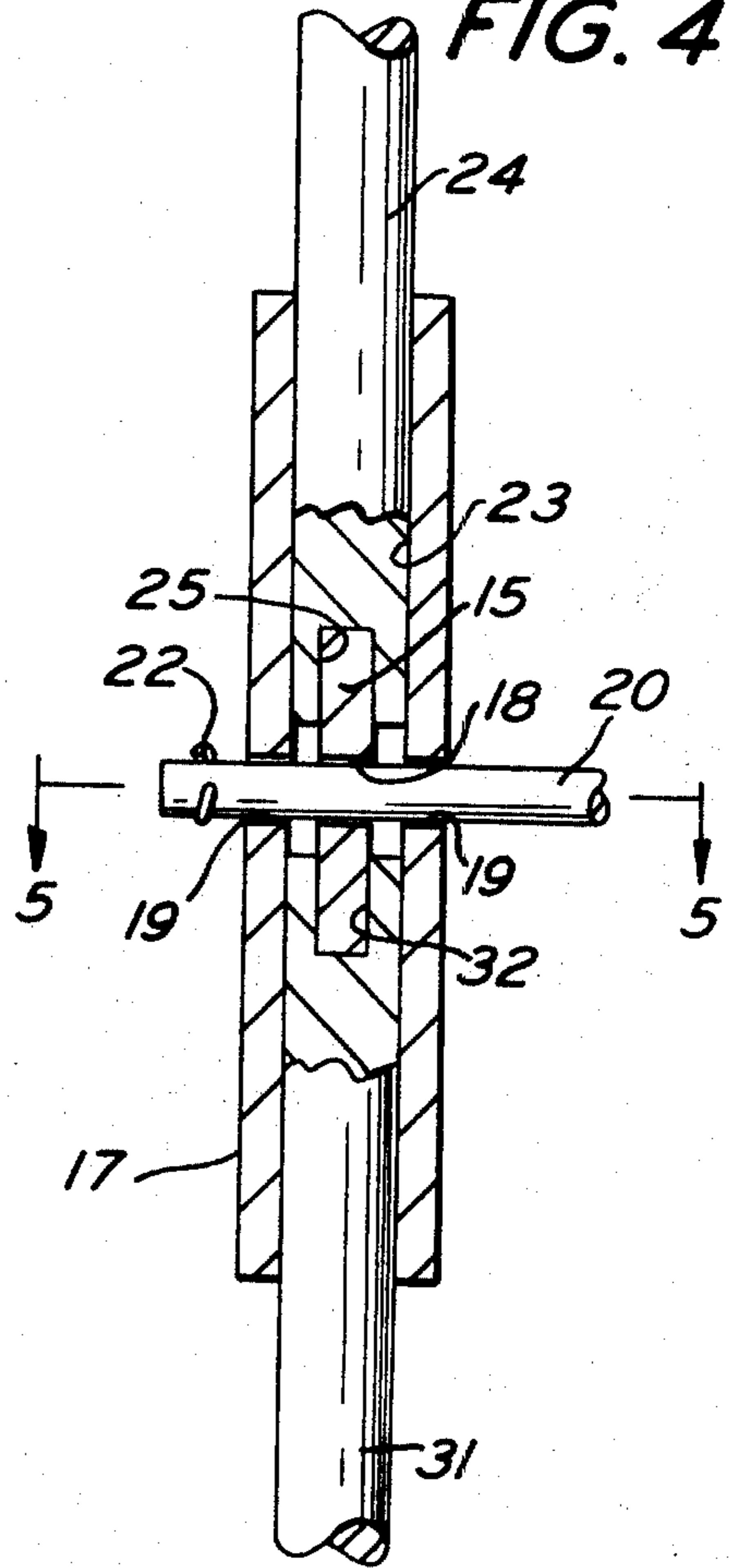


FIG. 6

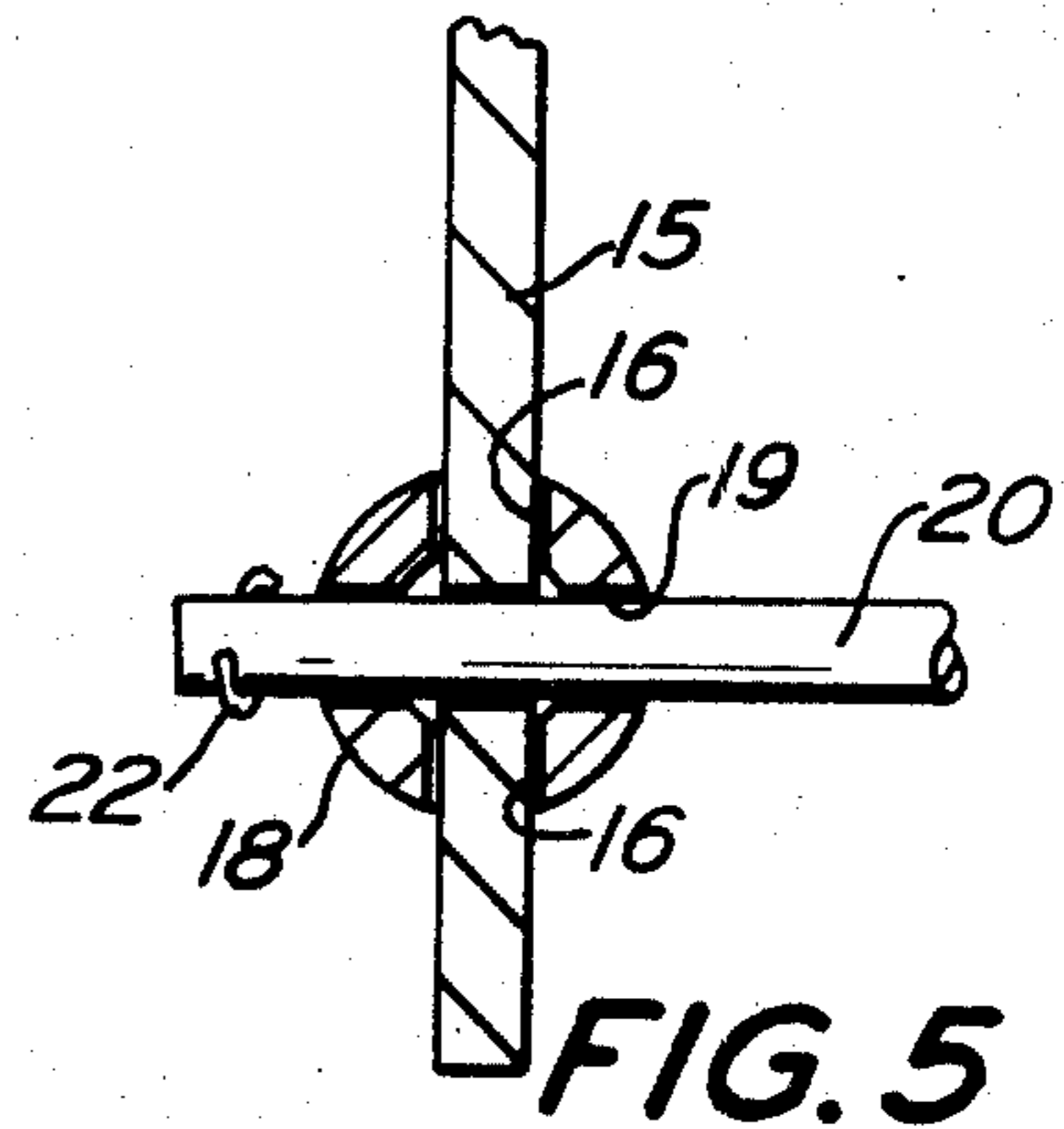


FIG. 5

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FIXTURE FOR HEAT TREATING FURNACES

BACKGROUND OF THE INVENTION

1. Field of the Invention

This invention relates to fixtures for heat treating furnaces and more particularly to fixtures having one or more tiers, as desired.

2. Description of the Prior Art

It has heretofore been proposed to provide demountable racks and frames employing rods, tubes and connectors. Typical constructions are shown in the U.S. Pat. to Jones, No. 1,598,727; Butsch, No. 2,591,049; Degener, No. 2,654,487; Wineman Jr., No. 2,738,883; Wolfson et al., No. 3,139,187; Meek, No. 3,351,207; and Keliehor, No. 3,392,947. While these structures were suitable for their respective purposes they are not suited for use in heat treating furnaces and lack the rigidity, strength and ease of assembly and disassembly in a desired number of tiers of the structure herein described.

SUMMARY OF THE INVENTION

In accordance with the invention a fixture for heat treating furnaces is provided, preferably of low specific heat and high temperature strength materials which are not subject to eutectic formation during clean up, is capable of assembly in one or more tiers, which is assembled from a plurality of horizontally disposed rectangular bars and round rods, a plurality of vertical rods and tubular connectors, the tubular connectors having intersecting openings for the horizontal bars and rods, the horizontal bars having openings through which the horizontal rods extend, and the vertical rods having end notches for engagement with the horizontal bars within the tubular connectors, the frame supporting horizontal workpiece holding racks.

It is the principal object of the present invention to provide a fixture for heat treating furnaces which is simple in construction, is assembled from a plurality of simple components, which is light in weight yet is strong and rigid, which can have a plurality of tiers as desired, and with which the cycle time is greatly reduced by reason of the low fixture mass and low specific heat of the materials used.

It is a further object of the invention to provide a fixture for heat treating furnaces which will have a greater ease of assembly and disassembly while retaining high strength and rigidity when in assembled condition.

Other objects of the invention will be apparent from the description and claims.

BRIEF DESCRIPTION OF THE DRAWINGS

The nature and characteristic features of the invention will be more readily understood from the following description taken in connection with the accompanying drawings forming part thereof, in which:

FIG. 1 is a view in perspective of a fixture in accordance with the invention, the upper tier section being moved upwardly to illustrate the details of construction;

FIG. 2 is an end elevation of the fixture shown in FIG. 1;

FIG. 3 is a fragmentary perspective view showing the tubular connector with horizontal bars and rods and vertical rods in assembled relation thereto;

FIG. 4 is a vertical sectional view, enlarged, taken approximately on the line 4—4 of FIG. 3;

FIG. 5 is a horizontal sectional view, taken approximately on the line 5—5 of FIG. 4; and

FIG. 6 is an exploded perspective view of the components shown in FIGS. 3, 4 and 5.

It should, of course, be understood that the description and drawings herein are illustrative merely and that various modifications and changes can be made in the structure disclosed without departing from the spirit of the invention.

Like numerals refer to like parts throughout the several views.

DESCRIPTION OF THE PREFERRED EMBODIMENT

Referring now more particularly to the drawings in which a preferred embodiment of the invention is illustrated, the fixture 10 is shown as being detachably assembled from bars, rods, tubular connectors and wire loops.

The fixture 10 is shown as removably supported on a plurality of spaced horizontal parallel supporting bars 11 disposed in a horizontal plane for its tier and carried in notched upper ends 12 of posts 13 in the bottom wall or floor of the furnace (not shown).

The fixture 10 has a plurality of spaced parallel horizontal bars 15, preferably rectangular in cross section and disposed in a common horizontal plane and which extend through complementary horizontal openings 16 in vertical tubular connectors 17.

The bars 15, in intersecting relation thereto, have horizontal openings 18 for alignment with horizontal openings 19 in the connectors 17. The openings 19 have their axes in intersecting relation to the axes of the openings 16 for the reception of spaced parallel horizontal rods 29, circular in cross section disposed in a common horizontal plane in each tier.

The rods 20 have openings 21 therethrough for the reception of retainer wires 22, preferably of molybdenum or the like, in S-shape.

The connectors 17 have central openings 23, circular in cross section, within which vertical rods 24 extend, the rods 24 being circular in cross section and having end notches 25 complementary in shape to the bars 15 for engagement therewith within the central openings 23.

The rods 24, at the bottom, can have their lower ends terminating in lower tubular connectors 26.

The lower tubular connectors 26, like the tubular connectors 15, have horizontal openings 27 for engagement with lower rack bars 28, rectangular in cross section, and intersecting horizontal openings 29 for the reception of lower rack rods 30 which also intersect the bars 28 in the same manner in which the horizontal bars 15 and horizontal rods 20 engage within the connectors 17.

Lower vertical rods 31 with upper notched ends 32 engaging the bars 15 have similar lower notched ends engaging the lower rack bars 28.

A lower rack 35 is provided which includes spaced parallel bars 36 between the lower rack bars 28 and spaced parallel rods 37 between the rack rods 30. The bars 36 for the lower rack 35 are supported on the bars 11.

As many tiers as are desired can be employed while remaining within proper loading limits by successive application of connectors 17 and rods 24.

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The bars 15 are illustrated as carrying horizontal racks 40 each comprising end bars 28, intermediate bars 36 and rods 30 and 37.

The rods 30 and 37 extend through the bars 28 and 36 and retainer wires 22 can be used as desired to retain a particular positioning of the rods 30, 37 and bars 28, 36.

The frame 10 and racks 35 and 40 as heretofore described can be readily assembly from individual components and can be disassembled in whole or in part as desired by removal of the looped wires 22 and separation of the components for storage or for replacement.

The frame 10 and racks 35 and 40 as heretofore described has low fixture mass of about one half to one fifth the weight of conventional fixtures, and the low specific heat of the material permits much more rapid heating and cooling, both these characteristics contributing to reduction of furnace cycle time and consequent savings. The freedom from distortion and sag minimize replacement costs.

The frame 10 and racks 35 and 40 as described can withstand temperatures up to 3,000° F. and can remain in the furnace during bake-out and clean-up.

I claim:

1. A fixture for heat treating furnaces comprising a frame, said frame comprising horizontal frame bars, horizontal frame rods in intersecting relation to said frame bars and in horizontally slidable engagement therein, vertical tubular connectors within which the intersecting portions of said bars and rods are disposed and beyond which said frame bars and rods extend, aligned vertical upper and lower frame rods each having aligned notched end portions in engagement with the top and bottom of one of said frame bars within one of said connectors, and

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members outside said tubular connectors detachably retaining said rods from disengagement from said bars.

2. A fixture as defined in claim 1 in which said horizontal frame bars are rectangular in cross section and said connectors each has a horizontal complementary bar receiving opening within which said bar extends.
3. A fixture as defined in claim 1 in which said horizontal frame rods are round in cross section and said connectors each has a horizontal complementary rod receiving opening within which said rod extends.
4. A fixture as defined in claim 2 in which said horizontal frame rods are round in cross section, and said connectors each has a horizontal complementary rod receiving opening in intersecting relation to said bar receiving opening.
5. A fixture as defined in claim 1 in which said rods and said bars are of a material selected from the group consisting of molybdenum, tungsten, tantalum, columbium and their alloys and graphite.
6. A fixture as defined in claim 1 in which said rods and said bars are of molybdenum.
7. A fixture as defined in claim 1 in which said members are retainer wires extending through said rods limiting the relative movement of said rods and said connectors.
8. A fixture as defined in claim 1 in which there is further included additional horizontal frame bars disposed in parallel relation are carried by said horizontal frame rods in intersecting relation to and extending through said horizontal frame bars.

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