

[54] **FIXTURE FOR HEAT TREATING FURNACES**

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[22] Filed: **Feb. 16, 1971**

[21] Appl. No.: **114,937**

[52] U.S. Cl. .... **263/47 R**

[51] Int. Cl. .... **F27b 21/04**

[58] Field of Search ..... **220/19; 34/237, 238; 263/47, 263/47 A**

2,420,428 5/1947 Hill et al. .... **263/47 A**  
3,227,431 1/1966 Steeves ..... **263/48**

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[57] **ABSTRACT**

A fixture for heat treating furnaces is disclosed having a frame composed of upright bars, horizontal and diagonal bars and horizontal rods held in assembled relation by wires, of low fixture mass, the bars, rods and wires preferably being of low specific heat material, and preferably of molybdenum but alternatively of tungsten, tantalum, columbium and their alloys or of graphite, with an associated rack of the same material having horizontal ceramic tubes to support the articles to be heat treated in the furnace.

[56] **References Cited**

**UNITED STATES PATENTS**

**5 Claims, 5 Drawing Figures**

3,092,375 6/1963 Bixby ..... **263/47**

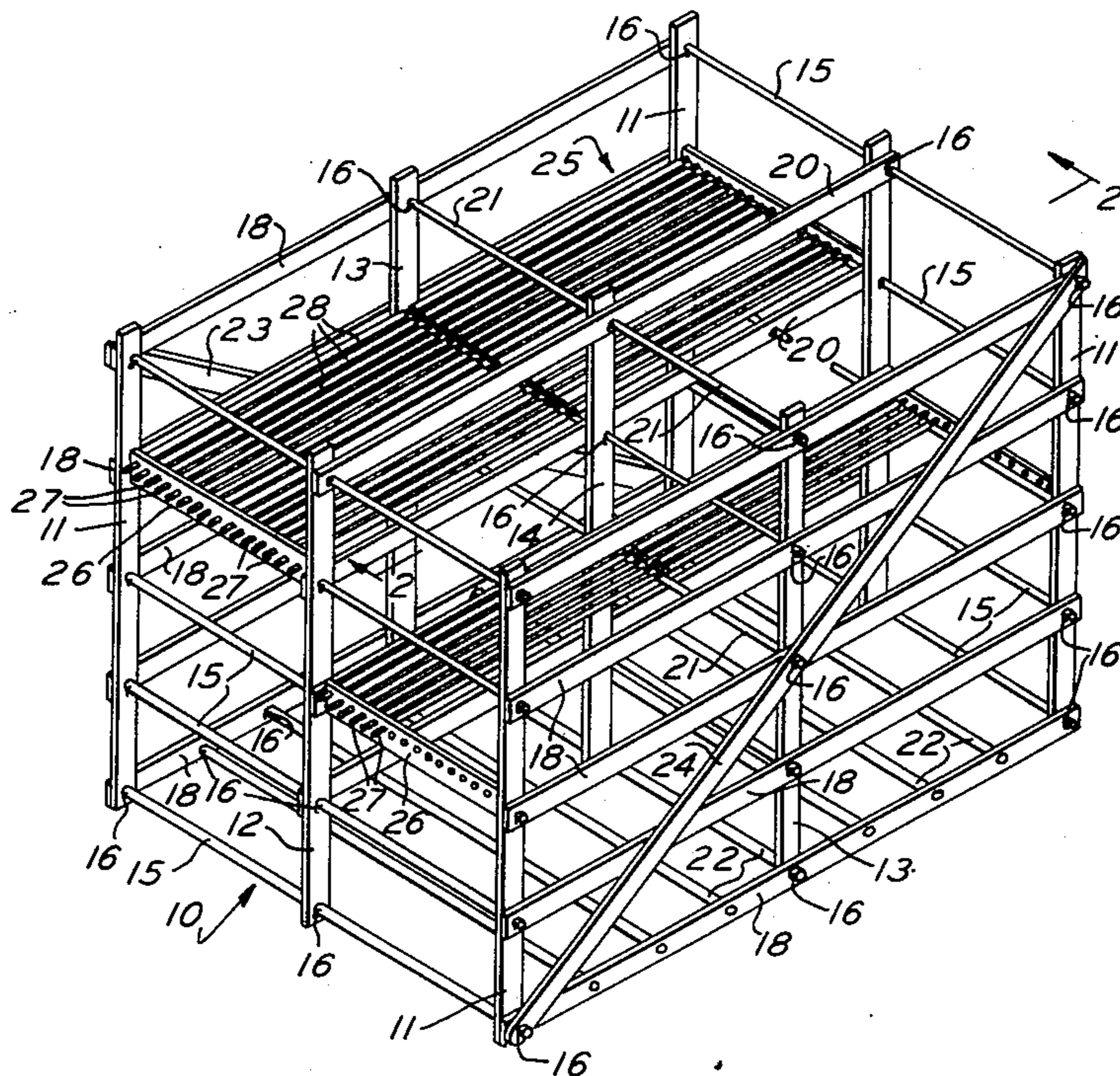


FIG. 1

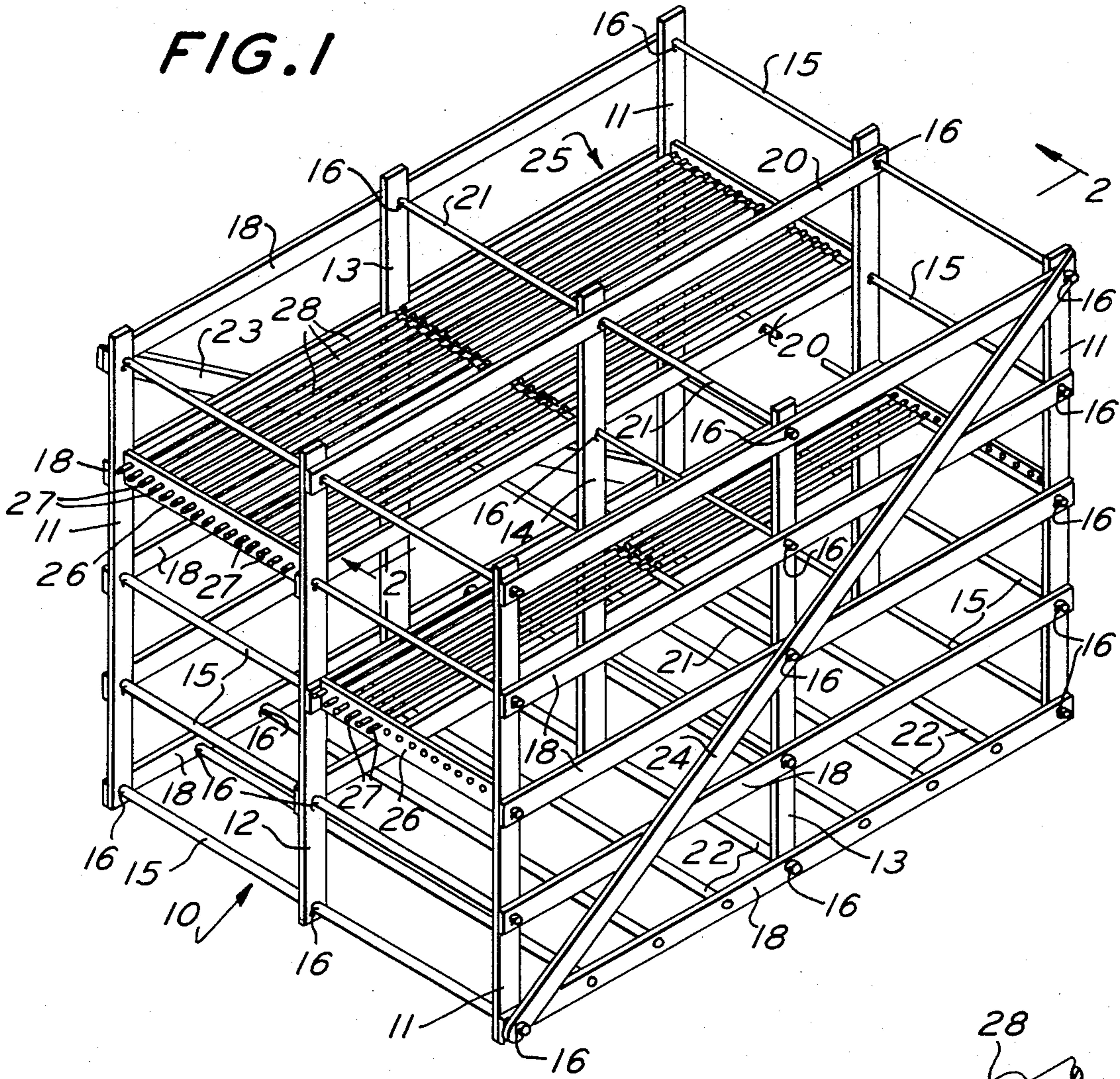


FIG. 4

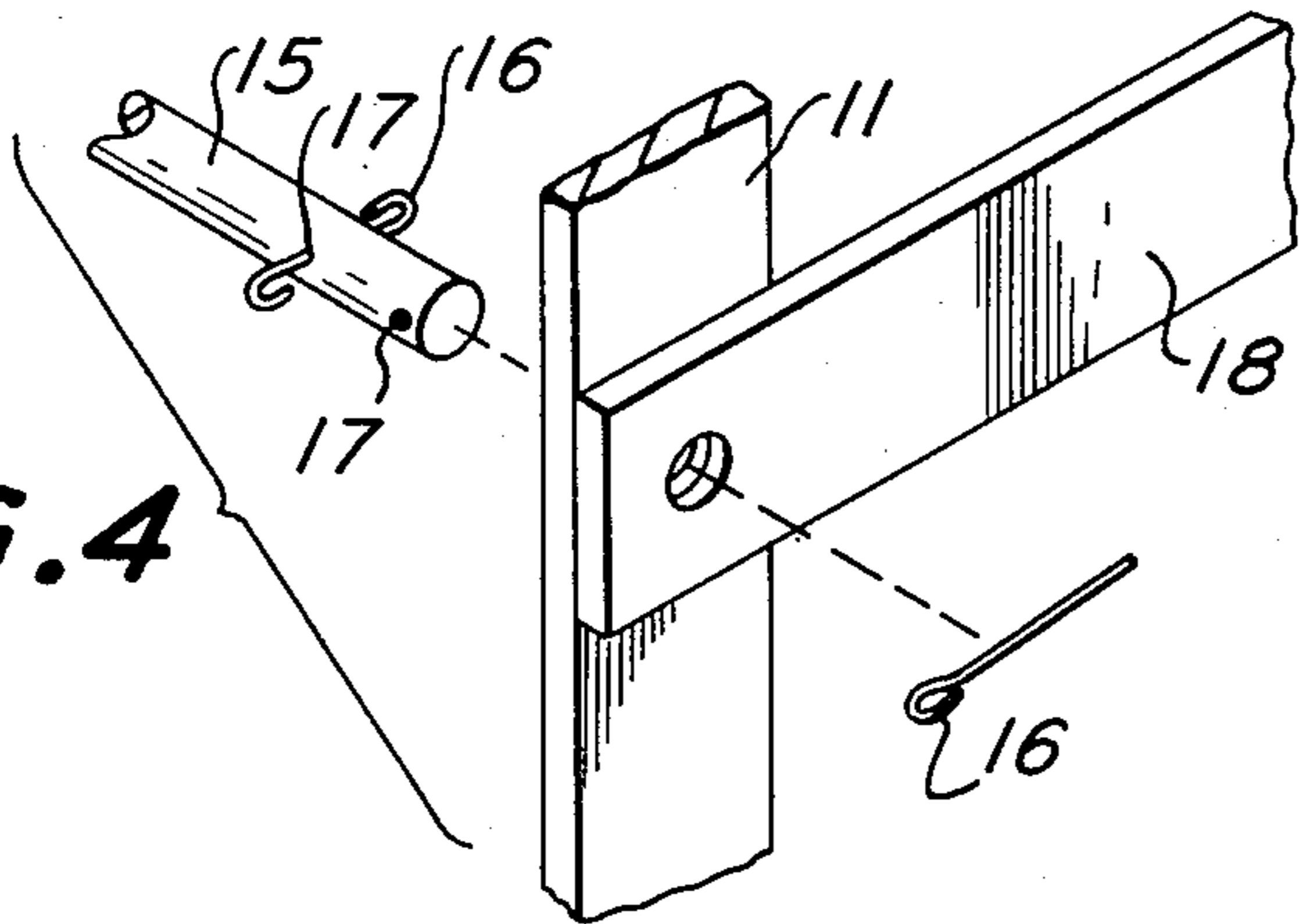
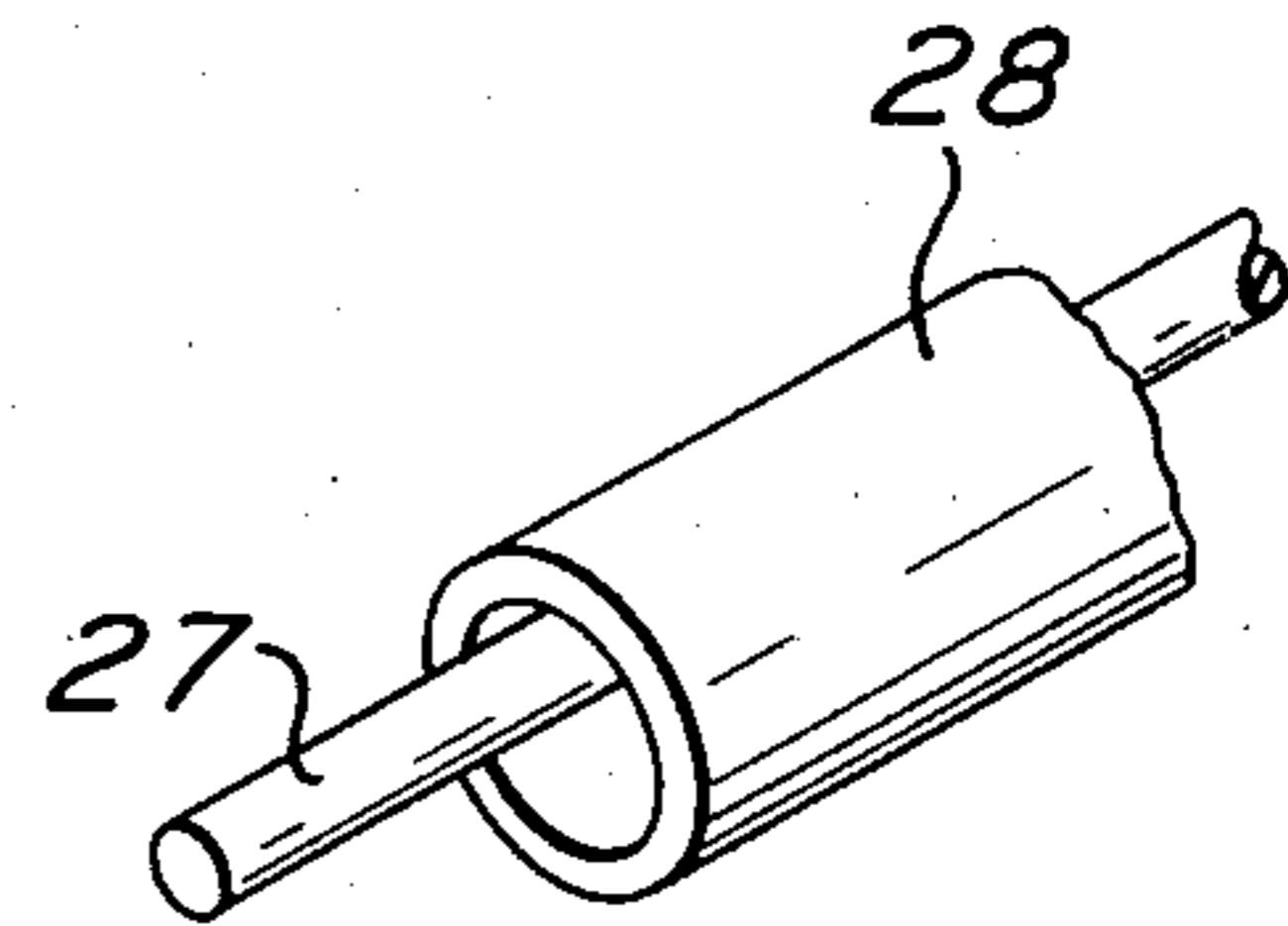


FIG. 5



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FIG. 2

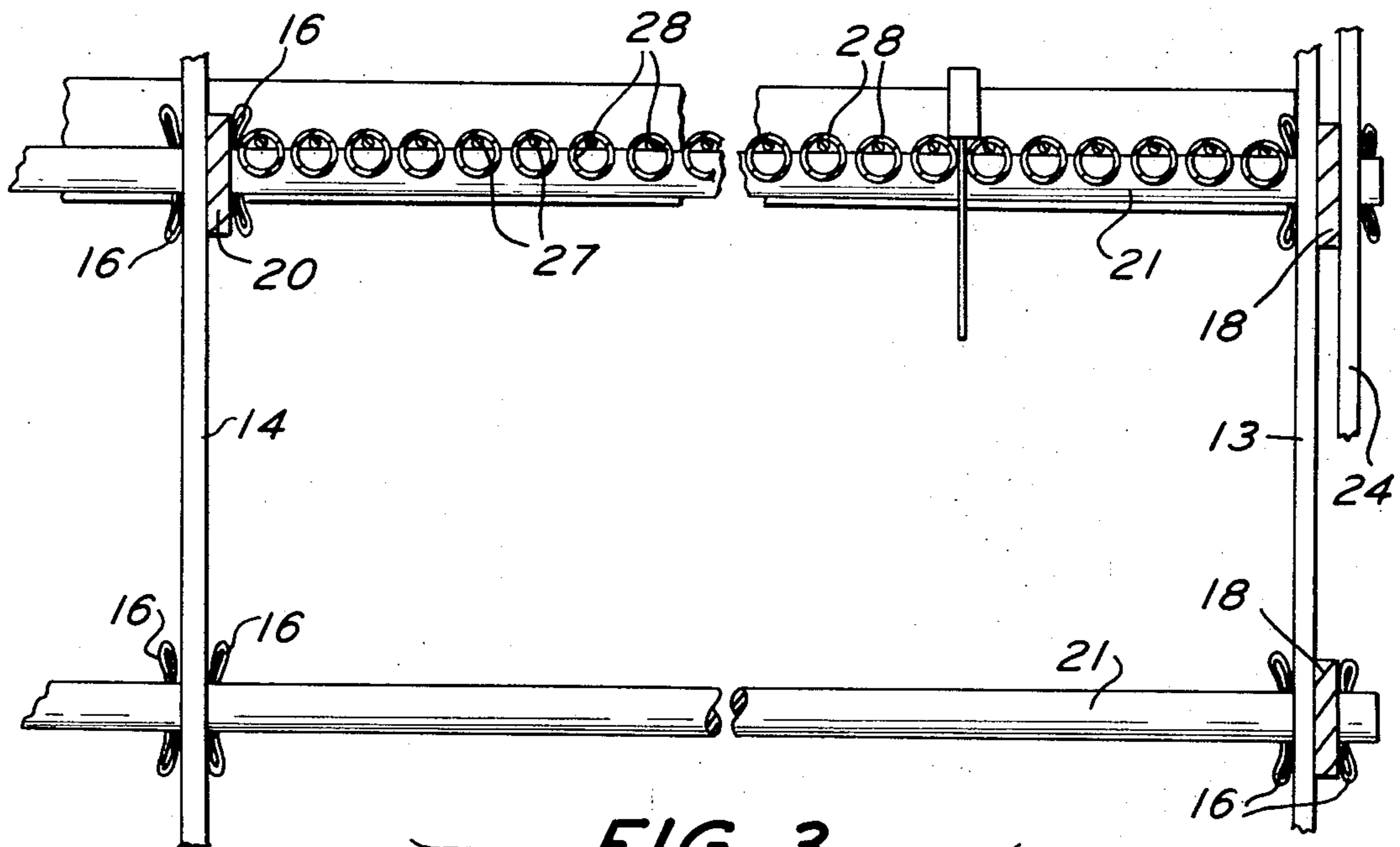
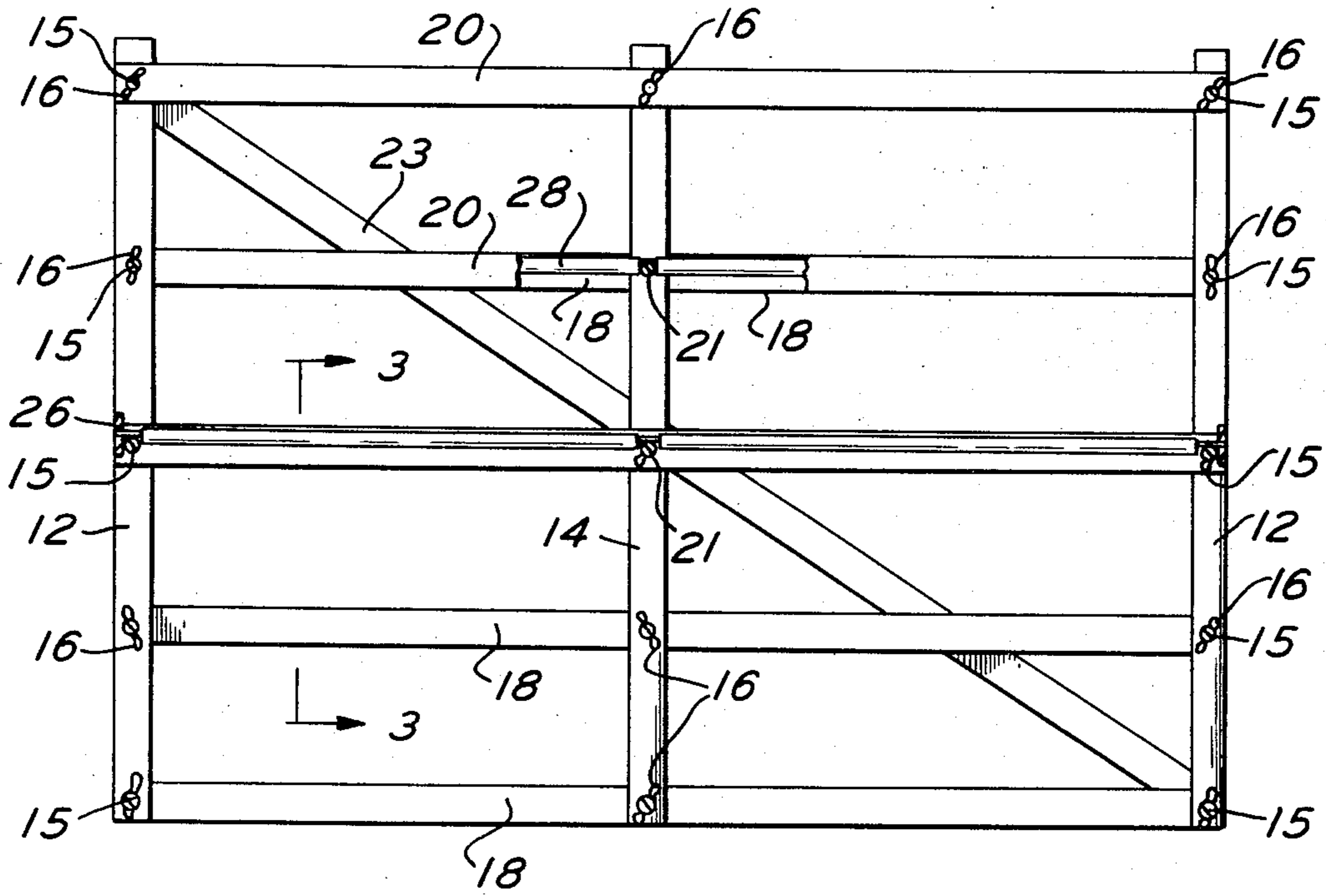


FIG. 3

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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.

#### 2. Description of the Prior Art

It has heretofore been proposed to employ fixtures which were molded or cast of nickel base alloys for supporting in a heat treating furnace the articles to be heat treated. The fixtures heretofore available had various shortcomings including relatively high mass which lengthened and thus adversely affected the cycle time, relatively high specific heat of the metal which also adversely affected the cycle time, a tendency to sag and distort with relatively short life, the necessity for removal during bake-out and clean-up cycle to avoid formation of an eutectic, and lack of adaptability to work pieces of different sizes and shapes.

The objectionable features of the prior fixtures are overcome with the fixtures of the present invention.

### SUMMARY OF THE INVENTION

In accordance with the invention a fixture for heat treating furnaces is provided, with a plurality of support levels for work pieces, which is assembled from bars and rods and wire, of relatively low fixture mass, preferably of low specific heat and high temperature strength materials, such as molybdenum, tungsten, tantalum, or columbium and their alloys, or which may be of graphite, and which are not subject to eutectic formation during clean up, certain of the rods carrying ceramic tubes to support the work pieces.

It is the principal object of the present invention to provide a fixture for heat treating furnaces with which the cycle time is greatly reduced by reason of the low fixture mass and low specific heat of the material and which will have a longer life than that of fixtures heretofore available.

It is a further object of the present invention to provide a fixture for heat treating furnaces which, by reason of its decreased weight as compared with those heretofore available, makes for greater ease of handling for introduction into the furnace and for removal.

Other objects and advantageous features of the fixture 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 for heat treating furnaces in accordance with the invention;

FIG. 2 is a vertical sectional view taken approximately on the line 2—2 of FIG. 1;

FIG. 3 is a fragmentary vertical sectional view, enlarged, taken approximately on the line 3—3 of FIG. 2;

FIG. 4 is an exploded perspective view showing a preferred mode of joining bars and a rod for assembly of the fixture, and

FIG. 5 is a fragmentary perspective view showing the mounting of a work carrying ceramic tube on one of the rods.

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 shown the fixture 10 has opposite end and side walls with a plurality of horizontal shelves, the fixture being detachably assembled from bars, rods, tubes and wire loops.

The fixture 10 includes vertical corner upright bars 11, vertical intermediate end wall upright bars 12, vertical intermediate side wall upright bars 13, and a central upright bar 14.

The corner uprights 11 are secured together by spaced horizontal transverse rods 15, with looped wires 16 extending through openings 17 and engaged therewith, the rods 15 extending through the intermediate end wall uprights 12. The intermediate uprights 12 and rods 15 are held against relative movement by looped pins or wires 16.

The corner uprights 11 are held together to provide opposite side walls by longitudinal horizontal side bars 18 through which the rods 15 extend, the bars 18 being held by looped wires 16 at each end.

The oppositely disposed intermediate uprights 12 are connected by longitudinal horizontal bars 20 carried on the rods 15 and held against movement by looped wires 16.

Alternate bars 20 can be disposed on opposite sides of the vertical uprights 12.

The intermediate side wall bars 20 are connected by rods 21, similar to the rods 15, which extend through the central upright bar 14. Wire loops 16, as before, prevent relative movement of the rods 21 with respect to the side wall bars 20 and the upright bars 14.

The lowermost horizontal bars 18 preferably have horizontal transverse rods 22 extending therethrough and held against displacement by looped wires 16.

The side walls have opposite diagonal brace bars 23 and 24 extending respectively from an uppermost rod 15 at one end to a lowermost rod 15 at the other end. The brace bars 23 and 24 are held on the rods 15 and against the corner bars 11 and side wall bars 13 by looped wires 16.

The bars 11, 12, 13, 14, 18, 20, 23, and 24 in the specific embodiment illustrated are preferably rectangular bars  $\frac{1}{4}$  inch by  $1\frac{1}{4}$  inch or  $1\frac{1}{2}$  inch and the rods 15 can be of  $\frac{3}{8}$  inch to  $\frac{5}{8}$  inch diameter, dependent upon the loading. The bars, rods and the looped wires 16 are preferably of refractory metals such as molybdenum, tungsten, tantalum, columbium and their alloys and the bars and rods can also be of graphite.

The frame 10 as heretofore described can be readily assembled from individual components and can be disassembled in whole or in part as desired by removal of the looped wires 16, for storage or for replacement of components.

The frame 10 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 as described can withstand temperatures up to 3000°F and can remain in the furnace during bake-out and clean-up.

While the frame 10 as heretofore described can be used for some purposes it is preferred to employ a rack 25 composed of horizontally transversely disposed end bars 26 in upright arrangement, connected by a plurality of horizontal rods 27 and held by wires 16 as before and which at the center can be supported directly on one of the transverse rods 21. The bars 26 and rods 27 are preferably made of the same material as that of the other bars, rods and wires. The rods 27 can, for some uses have a diameter of the order of 1/8 inch.

The rods 27 preferably carry ceramic tubes 28 which may have an outside diameter of the order of 1/2 inch with a central opening of about 3/8 inch. The ceramic tubes 28 provide a support for articles to be processed at temperatures in excess of 1600°F and up to 3000°F.

It will thus be seen that a fixture has been provided

for accomplishing the objects and purposes of the invention.

We claim:

1. A fixture for heat treating furnaces comprising a frame comprising upright corner bars connected to horizontal transverse end rods and horizontal longitudinal side bars, and a rack comprising horizontal end bars and longitudinal rods supported by said frame, said frame and said rack being of refractory material, said rack rods carrying ceramic tubes for work piece engagement.
2. A fixture as defined in claim 1 in which the connections between said bars and rods are detachable.
3. A fixture as defined in claim 2 in which the connections comprise wires extending through said rods and engaging contiguous bars.
4. 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.
5. A fixture as defined in claim 1 in which said rods and said bars are of molybdenum.

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