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(54) **HIGH TEMPERATURE VACUUM FURNACE
HEATED ELEMENT SUPPORT ASSEMBLY**

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(57) **ABSTRACT**

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(51)	Int. Cl.		4,612,651 A *	9/1986	Moller	H05B 3/66
	<i>F27D 7/06</i>	(2006.01)				373/110
	<i>F27D 11/02</i>	(2006.01)	4,860,306 A *	8/1989	Gibb	H05B 3/66
	<i>F27D 99/00</i>	(2010.01)				373/112
(52)	U.S. Cl.		5,282,221 A	1/1994	Benedict et al.	
	CPC	<i>F27D 2007/066</i> (2013.01); <i>F27D</i>	5,502,742 A *	3/1996	Kellogg	F27B 5/16
		<i>2099/0008</i> (2013.01)				239/597
(58)	Field of Classification Search		5,930,285 A	7/1999	Moller	
	USPC	219/542, 544, 546, 548, 552, 553;	6,021,155 A	2/2000	Jones	
		373/109, 117, 118, 119, 120, 123, 124,	6,023,487 A	2/2000	Jones	
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		373/133, 134, 137				373/128
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See application file for complete search history.

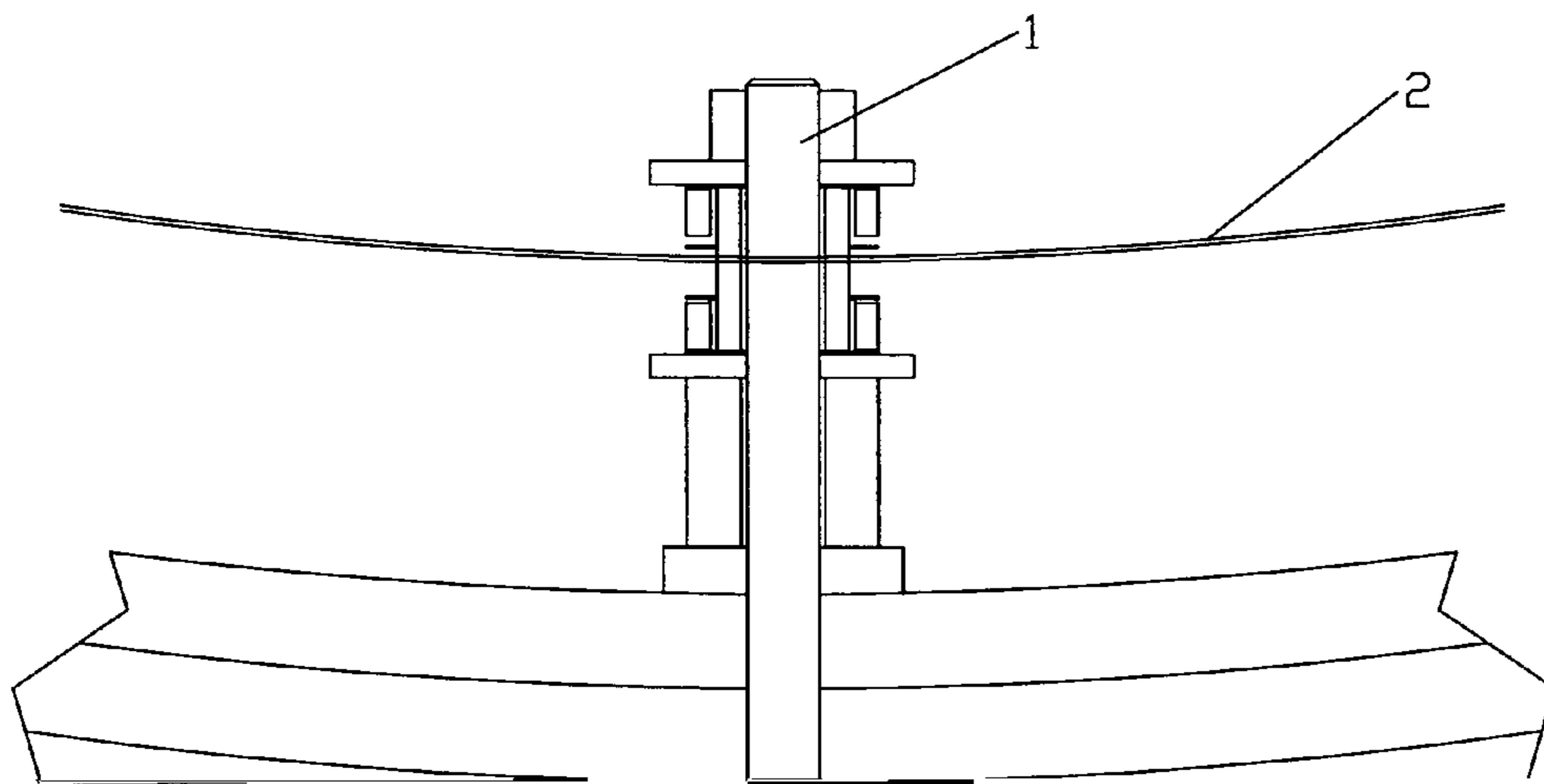


FIG. 1

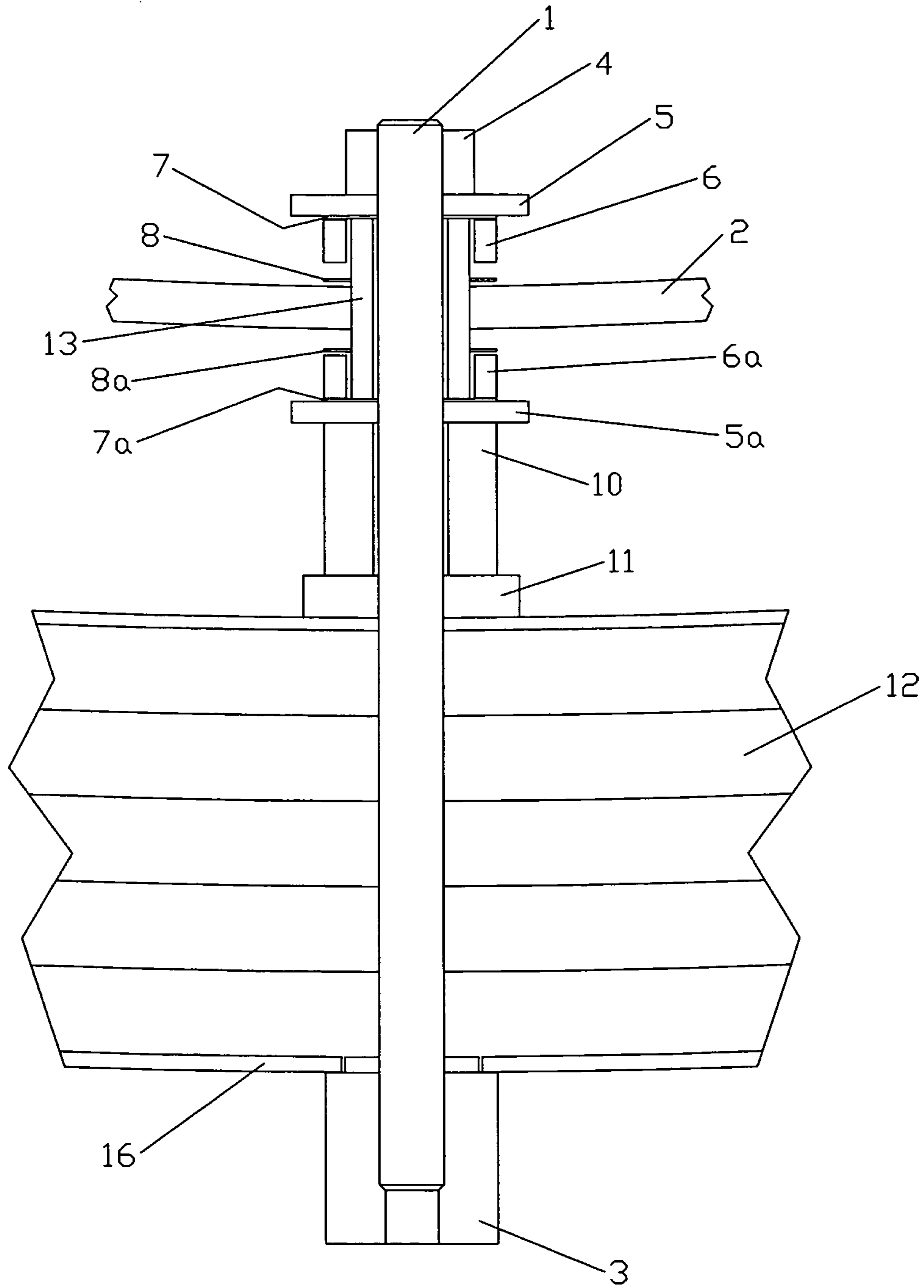


FIG. 2

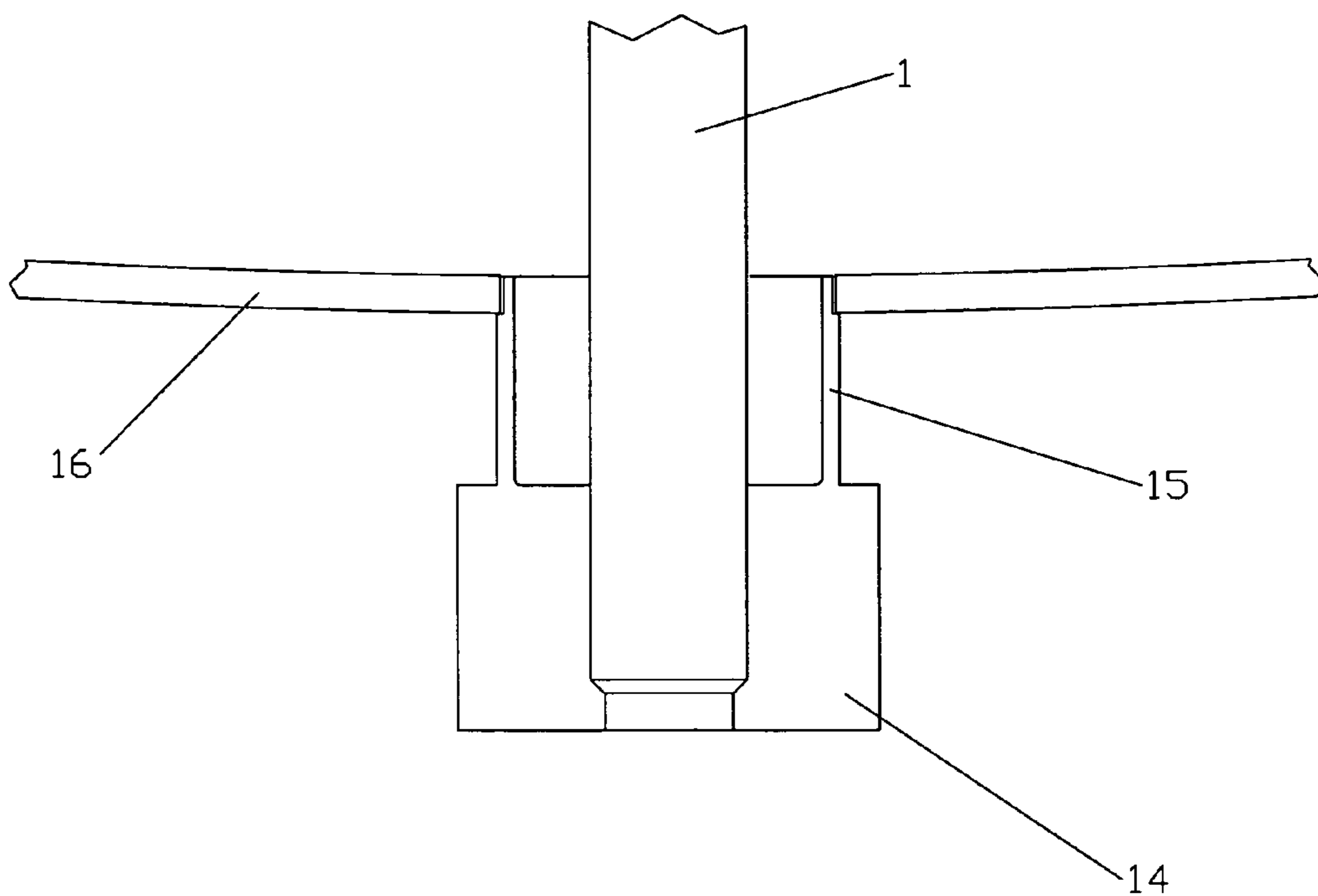


FIG. 3

HIGH TEMPERATURE VACUUM FURNACE

...but it also provides three locations for stress failure

HEATER ELEMENT SUPPORT ASSEMBLY

...within the rod and also failure of the fasteners inserted into

FIELD OF THE INVENTION

This invention relates to high temperature heat treating furnaces that employ electric resistance heating elements,

lifetime of the furnace. These weaknesses lead to loss of stability and movement within the support assembly, and loss of insulating capacity, as the support rods and heating elements are exposed to electrical currents. The result of

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and weaknesses of the prior art designs are as follows: (1) the support rod is a single solid piece of molybdenum, carbon fiber composite (CFC) or graphite material; (2) the support rod contains no holes or cuts in the material; (3) the cost of manufacturing the support rods is significantly reduced due to elimination of drilling the holes; (4) the cost

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insulated from the heating element. It allows the furnace to be easily and economically serviced with no replacement required for any of the support assembly elements. It further lowers the initial cost of manufacturing the elements necessary for this furnace configuration, as well as making replacement parts more readily available because of the

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In the embodiment illustrated in FIG. 1 the heating element bank is not formed into a complete loop, but has two ends at which an electrical power source is connected. If the

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preferably graphite. Sleeve 10 provides support for the insulation retainer 11, which in turn supports the furnace insulation.

What is claimed is:

element, and a second portion of said second pair of insu-
lators surrounds said heating element on a second side of the

heating chamber with insulation material and insulation
retaining plate, a hot zone area for placing work piece
material for treatment, at least one hot zone support ring
wall, at least one heating element, at least one support rod to
provide a base for securing the heating element in spaced
relation to the hot zone support ring wall, and an electrical

heating element.

5 5. A support arrangement in accordance with claim 1
wherein said solid support rod is comprised of molybdenum.

6. A support arrangement in accordance with claim 1
wherein said solid support rod is comprised of carbon fiber
composite.

7. A support arrangement in accordance with claim 1