

July 1, 1969

G. MAYER ETAL.
VAPORIZATION VESSEL FOR USE IN VAPOR
DEPOSITION UPON A CARRIER SUPPORT
Filed May 12, 1967

3,452,970

Prior Art

Fig.1

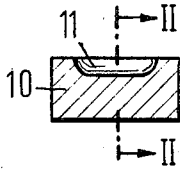


Fig.2

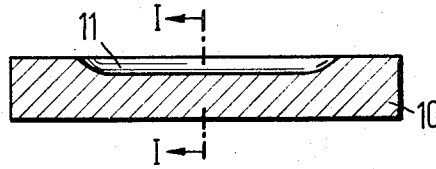


Fig.3

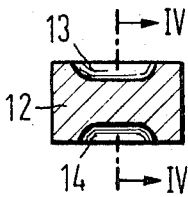


Fig.4

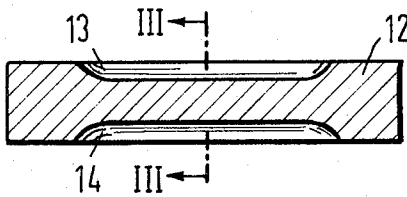


Fig.5

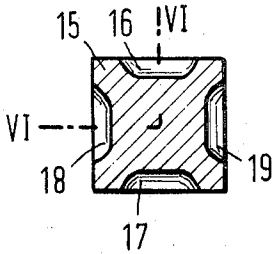


Fig.6

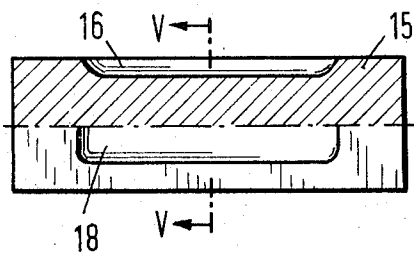
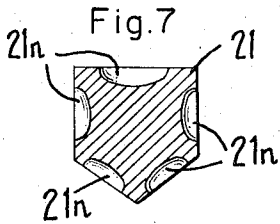


Fig.7



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VAPORIZATION VESSEL FOR USE IN VAPOR DEPOSITION UPON A CARRIER SUPPORT

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Filed May 12, 1967, Ser. No. 637,950

Int. Cl. F27b 21/04; F27d 5/00

U.S. Cl. 263—47

4 Claims

ABSTRACT OF THE DISCLOSURE

A bar-shaped vessel for containing material to be vaporized, in connection with the vapor deposition, for example, of aluminum, in which destructively acting physical and chemical changes in the material of the vessel normally occur during usage, in which the vessel is provided with a symmetrical cross sectional configuration and is provided with at least two recesses approximately corresponding in shape and size, which are disposed on the surface of the vessel by approximately 180°, by means of which balanced arrangement such changes are minimized.

The invention relates to a bar-shaped vessel for use in the vapor deposition, for example, of vaporization material such as aluminum, upon a band-shaped carrier support.

Frequently, in the vapor deposition of vaporization material, boat-shaped electrically conducting containers heatable by the passage of current therethrough are utilized which, if self-heating is not possible, may be heated through heatable elements such as inserts to corresponding temperatures. During the operation, the containers, and possibly the heating elements, are exposed to high thermal stresses, especially varying temperature stresses. In addition, in each case destructively acting physical and chemical changes in the material of the vessel can occur, the causes for which can be traced back to the evaporation material. The known vaporization vessels frequently have longer linear expansion and asymmetrical cross sections. This geometry of the vaporization vessel and especially its one-sided stresses resulting from the vaporization material lead, particularly in vessels made of sintering materials such as boron nitride mixed with titanium diboride, to distortions in the vessel and therewith to its premature destruction through the formation of cracks.

The problem underlying the present invention is to create a vaporization vessel which is so constructed that the foregoing disadvantages, in particular those occurring as a result of the distortion of the vessel and accompanying disturbing phenomena of the vaporization material, are to a large extent eliminated.

In order to solve this problem the invention proposes, in a bar-shaped vaporization vessel of the type initially mentioned, to form the same with at least two trough-shaped recesses or receptacles for receiving the vaporizing material which are at least approximately mirror inverted, or in other words, displaced relative to one another on the peripheral surface of the vessel by 180° and correspondingly proportioned.

A vessel of this type has, due to its symmetrical configuration, a high mechanical bending strength and therefore has only a slight tendency toward crack formation. Also, the portion of the distortion arising from chemical influence and the variable thermal demand on the lower and upper side due to the filling with the material to be vaporized as well as the inherent bulk and weight of the vessel can be compensated in the vaporization processes by selective utilization of receptacles which are oppositely disposed in at least almost mirror inverted manner. This

characteristic of the vaporization vessel, moreover, renders possible uniform wear and tear of the individual receptacles which receive the vaporating material and the more effective utilization of existing surfaces or sides of the vessel also leads to an increase in the life of the vessel.

In accordance with a further feature of the invention, the vaporization vessel can be provided with a symmetrical, polygonal cross section having an even number of sides, whereby again at least two of the peripheral surfaces, arranged in mirror inverted fashion relative to each other, have vessels for receiving vaporating material.

In a vaporization vessel with symmetrical, polygonal cross section with a great number of sides, the number of sides can, if necessary, also be uneven, whereby at least two of the peripheral surfaces arranged in approximately mirror inverted fashion relative to each other are provided with trough-shaped recesses or receptacles for the receipt of vaporizing material. For the sake of expediency, also in this case pairs of mirror inverted receptacles can be successively disposed for the receipt of the vaporizing material.

In the drawings are illustrated examples of vaporization vessels constructed in accordance with the prior art, as well as in accordance with the invention, and in which:

FIG. 1 is a cross section taken approximately on the line I—I of FIG. 2 through a vaporizing vessel of known type;

FIG. 2 is a cross section taken approximately on the line II—II of FIG. 1;

FIG. 3 is a cross section taken approximately on the line III—III of FIG. 4 through an evaporating shuttle in accordance with the invention;

FIG. 4 is a cross section taken approximately on the line IV—IV of FIG. 3;

FIG. 5 is a cross section taken approximately on the line V—V of FIG. 6 through another embodiment of the invention;

FIG. 6 is a cross section taken approximately on the line VI—VI of FIG. 5 and FIGURE 7 is a cross-sectional view of another embodiment of the invention.

A known vaporization vessel 10 illustrated in FIGS. 1 and 2 is provided on its peripheral surface with only a single trough-shaped receptacle for receiving vaporization material. In contrast thereto, the vaporization vessel 12 or 15 illustrated in FIGS. 3 to 6 has two receptacles 13, 14 or four receptacles 16 to 19 corresponding to each other and arranged in mirror inverted fashion. As indicated hereinbefore a vessel 21 having an uneven number of receptacles 21n, each approximately oppositely disposed to one another is likewise functional. The vaporization vessel can, for example, also have a circular, oval or elliptical configuration.

Thus, while incidental to the construction, any one of the receptacles can be employed to contain the vaporization material, a mere duplication of receptacles is not involved, the principal feature being the symmetrical configuration which eliminates damaging stresses during usage and thus provides an improved mechanical structure. The remaining advantages of multiple use and ability to balance effects of the evaporating material further contribute to the exceptional results achievable by use of this invention.

We claim:

1. A vaporization vessel adapted to contain a supply of vaporizing material comprising a multi-sided body having at least two trough-shaped recesses in the peripheral surface thereof defining receptacles for said vaporizing materials, said body being composed of sintered boron nitrate and titanium diboride and the recesses being disposed on approximately opposite sides of the body.

2. A vaporization vessel as defined in claim 1, wherein the body has a symmetrical polygonal configuration of

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size in which at least two oppositely disposed peripheral surfaces are provided with the trough-shaped recess.

3. The vaporization vessel as defined in claim 1, wherein the body has a symmetrical polygonal configuration of a large uneven number of sides in which at least two approximately oppositely disposed surfaces are provided with the trough-shaped recesses.

4. The vaporization vessel as defined in claim 1, wherein the body is disposed for rotation about its longitudinal axes.

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U.S. Cl. X.R.

23—292; 266—39

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