

COMMONWEALTH OF AUSTRALIA

593023

Patents Act 1952

CONVENTION APPLICATION FOR A STANDARD PATENT

X/WE, KERNFORSCHUNGSZENTRUM KARLSRUHE GESELLSCHAFT MIT BESCHRANKTER HAFTUNG,
a limited liability company, of Postfach 3640 D-7500 Karlsruhe 1,
Federal Republic of Germany

hereby apply for the grant of a Standard Patent for an invention
entitled

METHOD FOR PRODUCING A PLURALITY OF PLATE-SHAPED MICROSTRUCTURED METAL BODIES

which is described in the accompanying complete specification.

This application is made under the provision of Part XVI of the
Patents Act 1952 and is based on an application for a patent or
similar protection made

in Federal Republic of Germany

on 22nd October 1985

No. (P35 37 483.7)

in

on

No. (

My/Our address for service is:

F.B. RICE & CO.,

28A Montague St,

Balmain N.S.W. 2041

Dated this 3rd day of October 1986

KERNFORSCHUNGSZENTRUM KARLSRUHE
GESELLSCHAFT MIT BESCHRANKTER HAFTUNG

LODGED AT SUB-OFFICE

- 7 OCT 1986

Sydney

By:

Registered Patent Attorney

TO: The Commissioner of Patents, APPLICATION ACCEPTED AND AMENDMENTS
COMMONWEALTH OF AUSTRALIA

ALLOWED 20.11.89

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Patents Act 1952-1962

DECLARATION IN SUPPORT OF A CONVENTION
APPLICATION FOR A PATENT ~~OR PATENT OF ADDITION~~(1) Here
insert (in
full) Name of
Company.In support of the Convention Application made by⁽¹⁾
Kernforschungszentrum Karlsruhe GmbH, of Postfach 3640
D-7500 Karlsruhe 1, Federal Republic of Germany

(hereinafter referred to as the applicant) for a Patent

(2) Here
insert title
of Invention.for an invention entitled:⁽²⁾METHOD FOR PRODUCING A PLURALITY OF PLATE-SHAPED MICROSTRUCTURED
METAL BODIES(3) Here
insert full Name
and Address,
of Company
official
authorized
to make
declaration.I, ⁽³⁾ Peter Gottlob and Dieter Gerlach, both
of D-7500 Karlsruhe, Weberstr. 5, West Germany,
of and care of the applicant company

do solemnly and sincerely declare as follows:

We are

1. ~~xxx~~ authorised by the applicant for the patent
to make this declaration on its behalf.

2. The basic application as defined by Section 141 of the Act was

made in⁽⁴⁾ West Germany
on the 22nd day of October 1985, by the
present applicant company~~on the day of 1985, by
Kernforschungszentrum Karlsruhe GmbH~~(5) Here
insert (in
full) Name
and Address
of Actual
Inventor or
Inventors.3. ⁽⁵⁾ Dr. Wolfgang Ehrfeld, Reutstr. 27, 7500 Karlsruhe 41,
Dr. Peter Hagmann, Nagoldstr. 9c, 7514 Eggenstein-Leopoldshafen,
Dr. Asim Maner, Guntherstr. 1, 7513 Stutensee 1, Dr. Dietrich Münch-
meyer, Hagackerstr. 5, 7513 Stutensee 3, Prof. Dr. Erwin Becker,
Strahlerweg 18, 7500 Karlsruhe 41, all of West Germany
~~is~~ are the actual inventors of the invention and the facts upon which the applicant
is entitled to make the application are as follow:~~The applicant is the assignee of.~~ The applicant is a person who
would if a patent were granted upon an application made by the
actual inventor, be entitled to have the patent assigned to it.4. The basic application referred to in paragraph 2 of this Declaration
was the first application made in a Convention country in
respect of the invention the subject of the application.

DECLARED at Karlsruhe, West Germany

this 19th day of February 1986

(6) Signature.

(6)

To: THE COMMISSIONER OF PATENTS.

Peter Gottlob
PatentassessorDieter Gerlach
Patentingenieur

(12) PATENT ABRIDGMENT **(11) Document No. AU-B-63570/86**
(19) AUSTRALIAN PATENT OFFICE **(10) Acceptance No. 593023**

(54) Title
METHOD FOR PRODUCING A PLURALITY OF PLATE-SHAPED MICROSTRUCTURED METAL BODIES

International Patent Classification(s)
(51)⁴ **C25D 001/10 B01D 059/18**

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(74) Attorney or Agent
F.B. RICE & CO.

(56) Prior Art Documents
EP 143223
AU 558628 15713/83 C25D 1/10
US 3649474

(57) Claim

1. A method for producing a plurality of metal plate-shaped microstructure bodies from a single moulding tool, said tool having corresponding microstructure faces and at least one recess therebetween, said method comprising producing a negative mould of the tool by pouring an electrically insulating moulding material over said tool and removing any of said electrically insulating moulding material flowing over the microstructure faces, after partial hardening of the electrically insulating moulding material in the tool, coating the tool and electrically insulating moulding material with an electrically conductive moulding material, after complete hardening of both the electrically insulating moulding material and electrically conductive moulding material, removing the tool from the moulding materials, electrolytically filling the negative mould with metal, by

(11) AU-B-63570/86
(10) 593023

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means of the electrically conductive coating, to produce the metal body and removing both the electrically insulating moulding material and electrically conductive moulding material from the resultant metal body.

2. A method for producing a plurality of metal plate-shaped microstructure bodies substantially as hereinbefore described with reference to the accompanying drawings.

Patent Act 1952

C O M P L E T E S P E C I F I C A T I O N

(ORIGINAL)

Class

Int. Class

Application Number : 63570/86

Lodged :

Complete Specification Lodged :

Accepted :

Published :

Priority:

22 October 1985

This document contains the
amendments made under
Section 49 and is correct for
printing.

.....Related Art :
.....
.....
.....Name of Applicant : KERNFORSCHUNGSZENTRUM KARLSRUHE GESELLSCHAFT MIT
BESCHRANKTER HAFTUNGAddress of Applicant : Postfach 3640 D-7500 Karlsruhe 1, Federal Republic of
GermanyActual Inventor : Dr. Wolfgang Ehrfeld, Dr. Peter Hagmann, Dr. Asim Maner,
Dr. Dietrich Munchmeyer, Prof. Dr. Erwin BeckerAddress for Service : F.B. RICE & CO.,
Patent Attorneys,
28A Montague Street,
BALMAIN. 2041.Complete Specification for the invention entitled:
METHOD FOR PRODUCING A PLURALITY OF PLATE-SHAPED MICROSTRUCTURED METAL BODIES

The following statement is a full description of this invention
including the best method of performing it known to us:-

The invention refers to a process to produce a plurality of plate-shaped microstructure bodies from metal.

A process of this type is disclosed in EP-A-0143223. There, a tool having microstructures is filled with
5 reaction resin and coated over; the overflow of the reaction resin mass is milled flat up to the end faces of the tool. The flat surface is covered with an electrically conductive substrate plate, this plate being coated with a synthetic material, preferably a positive
10 photosensitive resist is used. After moulding the photosensitive resist is exposed to light on the open lying area of the form layer and then dissolved with a solvent, so that in these places electrically conductive substrate surfaces will be obtained. The use and
15 treatment of a photosensitive resist is, however, relatively expensive. Most of all it is difficult to dissolve the photosensitive resist from the base where the gaps are narrow and deep between the structures of the form.

20 The object of the invention is to create a process of the generic type so, that the manufacturing expense will be reduced as well as the microstructures can be produced with high content of aspect ratio with the smallest characteristic dimensions of a few micrometers.

25 To achieve this object, the present invention comprises a method for producing a plurality of metal plate-shaped microstructure bodies from a single moulding tool, said tool having corresponding microstructure faces and at least one recess therebetween, said method
30 comprising producing a negative mould of the tool by pouring an electrically insulating moulding material over said tool and removing any of said electrically insulating moulding material flowing over the microstructure faces, after partial hardening of the electrically insulating
35 moulding material in the tool, coating the tool and electrically insulating moulding material with an



electrically conductive moulding material, after complete hardening of both the electrically insulating moulding material and electrically conductive moulding material, removing the tool from the moulding materials,

5 electrolytically filling the negative mould with metal, by means of the electrically conductive coating, to produce the metal body and removing both the electrically insulating moulding material and electrically conductive moulding material from the resultant metal body.

10 In the case of a process in accordance with the invention, the electrically conductive moulding material directly forms the electrically connected electrodes for the galvanic filling of the connected negative forms of the microstructures, with a metal.

15 An embodiment of the process is explained in the following based on Figs. 1 to 6:

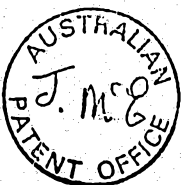
Fig. 1 shows, as an example, for a plate-shaped microstructure body the outline of a microstructure 20 from metallic hexagonal prisms 21, which are held on a base plate 19.

Figs. 2 to 6 clarify the carrying out of the process according to the invention based on cross-sections.

Fig. 2 shows a tool 22 which corresponds to the microstructure body 20. As electrically insulating moulding material 24 a cold-hardening casting resin (PLEXIT 74 with 4% by weight catalyst, type 20, both obtainable from Rohm) is being used and poured onto the tool 22. Immediately following the material, overflowing the faces 23a of the microstructure 23 of the tool 22 is wiped off with a wiper-like device, so that only the spaces 23b of the microstructures 23 are filled with the moulding material 24 (Fig. 3). After the partial hardening of this moulding material 24 it is coated with an electrically conductive moulding material 25, a mixture consisting of 25 parts per weight of carbon black CORAX L, 50 parts per weight PLEXIT 74, 5 parts catalyst Type 20



and 20 parts per weight methylmethacrylate (Fig. 4).
After both moulding materials 24, 25 are completely
hardened, it is removed from the mould, while the coating
of the electrically conductive moulding material 25 serves
5 as grip (Fig. 5). By galvanic filling of the thus
produced negative form 24, 25 by using the electrically
conductive layer 25 as an electrode and subsequent removal
of the negative form 24, 25 one obtains the plate-shaped
microstructure body 26 from metal (Fig. 6), which
10 corresponds to the body shown in outline in Fig. 1.



THE CLAIMS DEFINING THE INVENTION ARE AS FOLLOW:

1. A method for producing a plurality of metal plate-shaped microstructure bodies from a single moulding tool, said tool having corresponding microstructure faces and at least one recess therebetween, said method comprising producing a negative mould of the tool by pouring an electrically insulating moulding material over said tool and removing any of said electrically insulating moulding material flowing over the microstructure faces, after partial hardening of the electrically insulating moulding material in the tool, coating the tool and electrically insulating moulding material with an electrically conductive moulding material, after complete hardening of both the electrically insulating moulding material and electrically conductive moulding material, removing the tool from the moulding materials, electrolytically filling the negative mould with metal, by means of the electrically conductive coating, to produce the metal body and removing both the electrically insulating moulding material and electrically conductive moulding material from the resultant metal body.
2. A method for producing a plurality of metal plate-shaped microstructure bodies substantially as hereinbefore described with reference to the accompanying drawings.

DATED this 15 day of November 1989

KERNFORSCHUNGSZENTRUM
KARLSRUHE GmbH
Patent Attorneys for the
Applicant:

F.B. RICE & CO.



Fig. 1

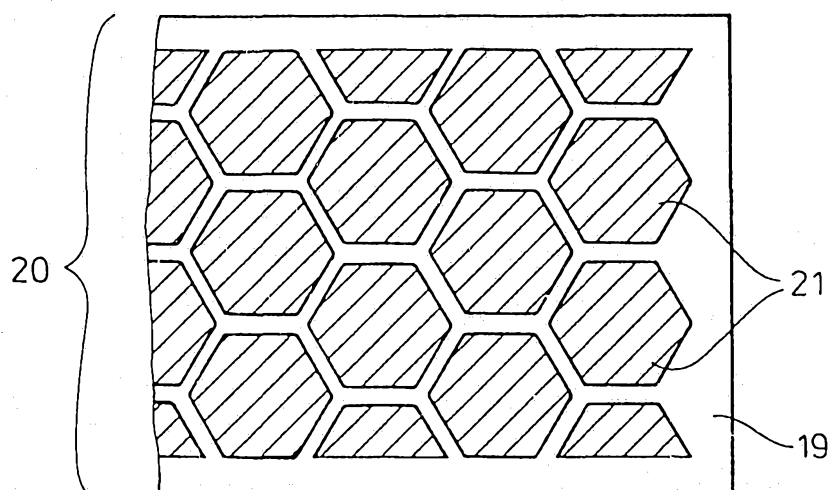


Fig. 2

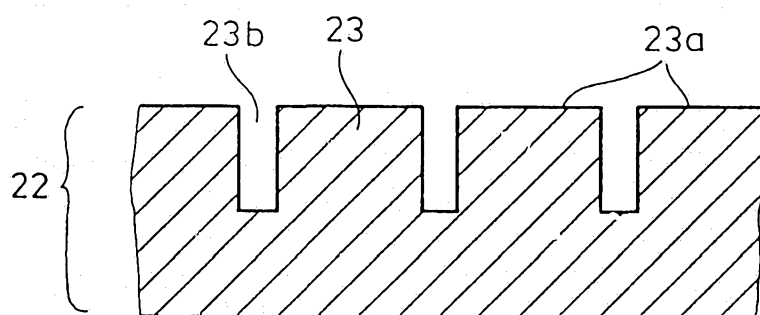
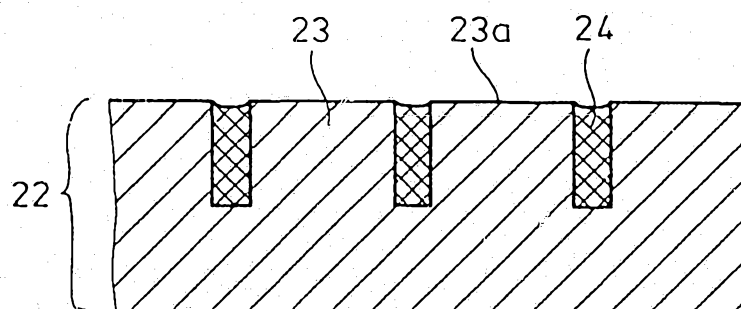


Fig. 3



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Fig. 4

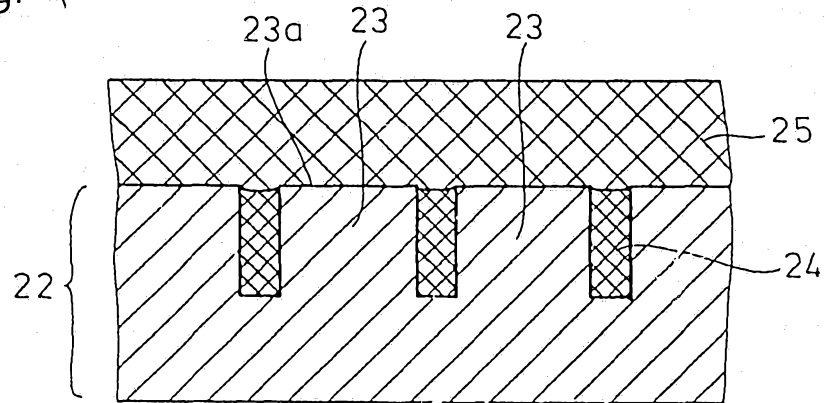


Fig. 5

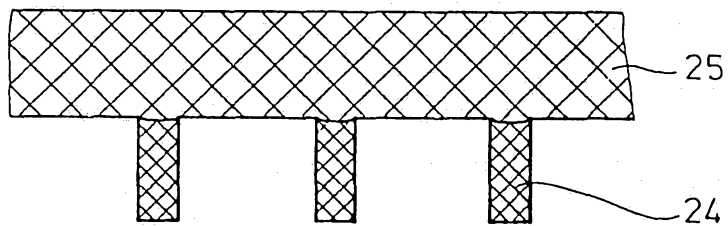


Fig. 6

