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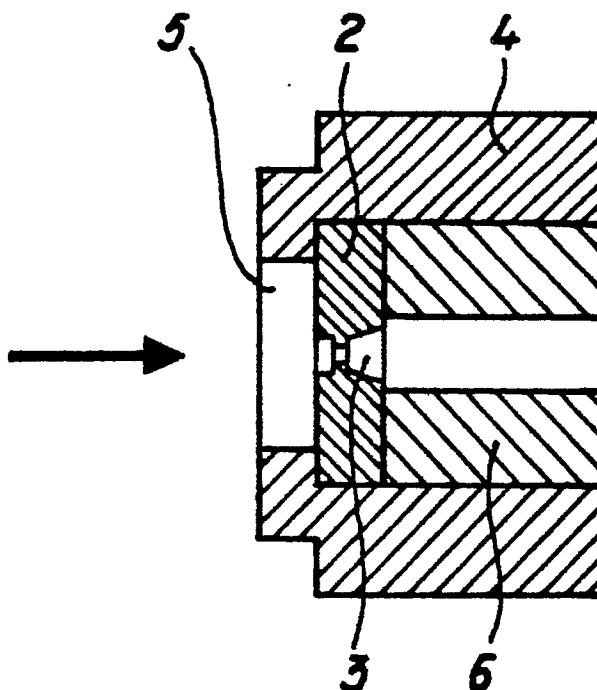
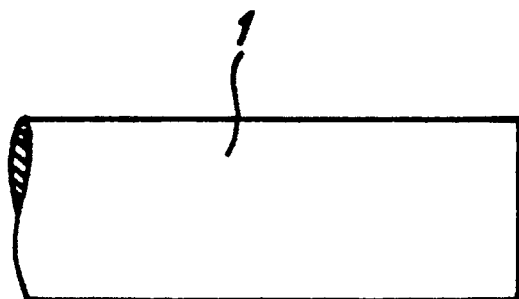
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(54) **Extrusion die and holder therefor.**

(57) Extrusion die, comprising a body (2) of hard, wear-resistant material in which one or more extrusion apertures are formed by means of spark erosion, the entire body being made of titanium

diboride, and die holder (4) which is made internally stepped, so that an antechamber (5) is present in front of the inlet side of the extrusion die.



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EXTRUSION DIE AND HOLDER THEREFOR.

The invention relates to an extrusion die, comprising a body of hard, wear-resistant material in which one or more extrusion apertures are formed by means of spark erosion.

Such an extrusion die is known from, for example, GB-A-2,143,448, in which a steel body is used.

Although these extrusion dies are very satisfactory for, for example, the extrusion of aluminium sections, their service life is limited, in other words, after a certain extrusion period the apertures are enlarged through wear in such a way that the extruded sections no longer meet the set requirements. For, extrusion takes place at high pressure and high temperature.

It is known to fit inserts of ceramic material in a steel die, in which case the extrusion aperture(s) is (are) situated in the insert or in each insert. The contour of the insert then fits precisely into a recess in the die. However, due to the difference in coefficient of expansion, this produces problems in practice.

The material H.P. titanium diboride TiB_2 , which can be pressed to a body under high pressure and temperature and then has a very high density of at least 98%, is now available on the market.

The chemical composition is 31.12% B and 68.88% Ti.

The melting point lies at 3390 ± 50 K.

Applicants have now found that this very hard and wear-resistant material is very suitable for manufacturing extrusion dies from it through spark erosion. The service life is thereby greatly increased.

According to the invention, the entire body is thus made from titanium diboride.

The use of a die body of titanium diboride requires a special die holder, which is characterized in that it is made internally stepped, so that an antechamber is present in front of the inlet side of the extrusion die.

In the schematic drawing the block of aluminium, called a billet, is indicated by 1. The die plate of titanium diboride is indicated by 2. In the example this plate has a die aperture 3 formed by spark erosion.

The die plate 2 is accommodated in a die holder 4.

This die holder 4 is according to the invention made stepped, so that the plate 2 rests against a step.

An antechamber 5 is in this way formed in the die holder 4 to the left of the die plate 2.

Situated to the right of the die plate 2 is a supporting tool 6 which supports the die plate 2 in the die holder during extrusion.

During extrusion the heated billet 1 is pressed through the extrusion aperture 3 in the known manner.

On completion of the extrusion process the aluminium still remaining in front of the antechamber 5 must be cut off.

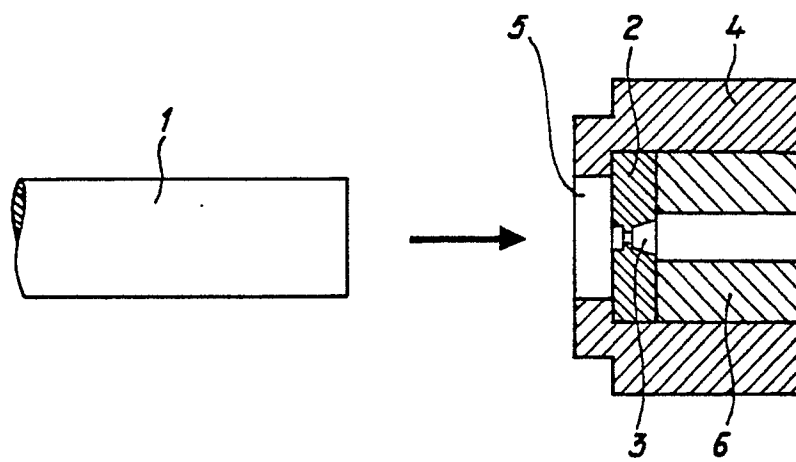
The cutting-off now takes place at a distance from the die plate (antechamber depth approx. 30 mm).

Besides, in that position the die plate can be given sufficient space on the diameter to bridge the difference in coefficient of expansion.

Claims

1. Extrusion die, comprising a body of hard, wear-resistant material in which one or more extrusion apertures are formed by means of spark erosion, **characterized in that** the entire body is made of titanium diboride.

2. Die holder for the extrusion die according to Claim 1, **characterized in that** the die holder is made internally stepped, so that an antechamber is present in front of the inlet side.





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EUROPEAN SEARCH REPORT

Application Number

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DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int. Cl.5)
X	THE TOOL & MANUFACTURING ENGINEER., vol. 54, no. 3, March 1965, pages 73-74, Milwaukee, US; J.G. HUNT: "Ceramic dies for hot extrusion" * Page 73, right-hand column, lines 11-13; page 74, tables 1,2 *	1	B 21 C 25/02
Y	IDEM ---	2	
Y	FR-A- 598 861 (BEGOT) * Figure *	2	
A	FR-A-2 078 045 (METALLWERK PLANSEE A.G.) * Page 2, lines 12-15; page 3, lines 7-8; claim 3 *	1	
A	FR-A-1 318 933 (A.O. SMITH CORP.) * Abstract, point 13c. *	1	
A	NL-A-7 603 342 (FRIED. KRUPP GmbH) * Figure 3 *	2	TECHNICAL FIELDS SEARCHED (Int. Cl.5)
A	US-A-2 894 623 (WALTON) * Figure 1 * -----	2	B 21 C
The present search report has been drawn up for all claims			
Place of search THE HAGUE		Date of completion of the search 25-09-1990	Examiner THE K.H.
CATEGORY OF CITED DOCUMENTS			
X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document		T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document	