

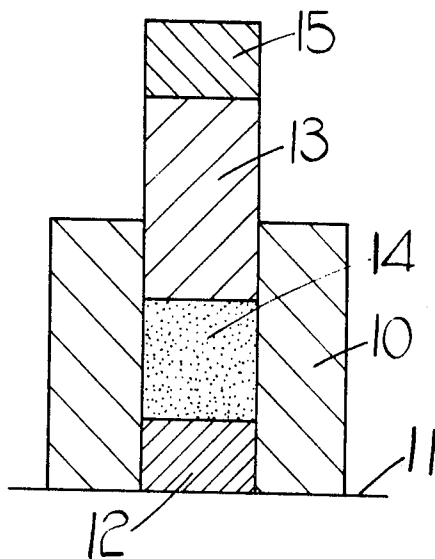
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DIE AND PUNCH SETS

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DIE AND PUNCH SETS

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1 Claim 10

ABSTRACT OF THE DISCLOSURE

A die and punch set for pressure sintering refractory non-metallic material comprising a hollow die, a punch intended to enter the interior of the die to compress powdered material therein, a plug against which the material is compressed by the punch and a spacer between the punch and the portion of the associated machine (not shown), by means of which pressure is applied, the spacer being formed from silicon nitride.

This invention relates to die and punch sets suitable for pressure sintering refractory non-metallic material, such as silicon nitride and of the kind comprising a hollow die and punch intended to enter the interior of the die to compress powdered material therein, and a spacer, which, in use, is disposed between the punch and a portion of the machine by which pressure is applied to the punch. Such a die and punch set will, for convenience, hereinafter be referred to as being of the kind specified.

In known sets, owing to the high pressures and temperatures at which the set operates, the life of the spacer is relatively short.

It is the object of this invention therefore to provide a die and punch set of the kind specified in which this disadvantage is mitigated.

In accordance with the present invention, a die and punch set of the kind specified, is characterised in that the spacer is formed from silicon nitride.

The invention will now be described by way of example with reference to the accompanying drawing, the single figure of which represents a die and punch set incorporating the present invention.

The set illustrated comprises a tubular die 10, which is arranged to be supported upon a flat bed 11 of an associated machine, and also on the bed 11 and in the lower end of the interior of the die 10, is a plug 12.

A punch 13 is arranged to enter the die interior from

the top, and between the punch 13 and the plug 12, is placed a charge of refractory non-metallic material such as silicon nitride indicated at 14.

Disposed on the top of the punch 13, and between this and the portion of a machine by which pressure is applied to the punch, is a spacer 15.

The parts 10, 12 and 13 of the die and punch set are formed from graphite, and the spacer 15 is formed from silicon nitride.

The die and punch set is intended to have pressures in the region of 4,500 pounds per square inch applied to the punch, and the temperature may reach 1800° C.

The use of silicon nitride for the spacer 15 affords a good heat insulating pad for protecting the upper end of the punch 13. Furthermore, the use of this material for the spacer, enables a shorter punch to be used than conventional sets with graphite spacers.

It may be necessary to coat the adjacent surfaces of the punch 13, the spacer 15 and the adjacent surface of the portion of the machine engaging the spacer, as well as the interengaging surfaces of the die, plug and bed 11, with a refractory filler material such as that described and claimed in the specification of our co-pending U.S. Patent application Ser. No. 792,607 now abandoned.

Having thus described my invention what I claim as new and desire to secure by Letters Patent is:

1. A die and punch set for pressure sintering refractory non-metallic material comprising a hollow die, a punch arranged to enter the interior of the die to compress powdered material therein, a flat base on which the die rests, and a spacer disposed between the punch and a portion of a machine by which pressure is applied to the punch, said spacer being formed from silicone nitride and defining a heat insulation pad means for thermally insulating the machine portion by which pressure is applied from temperature effects of said die and punch set.

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