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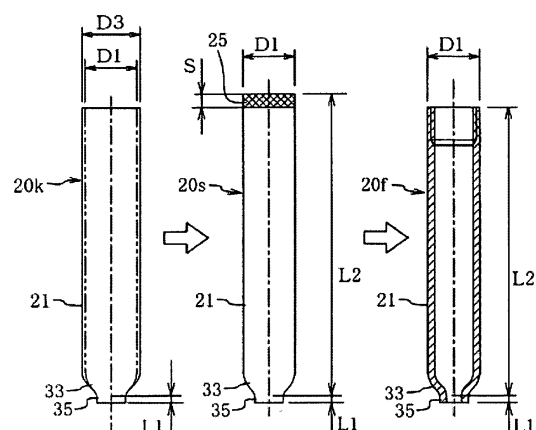
(54) **Manufacturing method of heater tube of glow plug and glow plug**

(57) [Objective] An object is to maintain at a predetermined amount the projection length of a projecting mouth portion projecting frontward from a tapered-off portion at the front end of a heater tube, to thereby prevent occurrence of welding failure, which would otherwise occur when a front end of a heat generation coil disposed within the heater tube is welded to the projecting mouth portion.

[Means for Solution]

The diameter D21 of a straight hole portion 123 of a forming hole 121 of a die 101 used in each of press steps including the final press step is made greater than the outer diameter of a heater tube finished product. A blank material 20 to undergo forming is pressed, with a support member 151 disposed on the front end side of the forming hole 121, whereby the projection length L1 of a projecting mouth portion 35 is maintained at a predetermined projection length. When the blank material 20 is excessively long, its outer diameter increases. Therefore, the blank material 20 is then passed through an ironing hole so as to adjust the outer diameter of the straight tube portion 21 of the heater tube in-process product to a predetermined dimension. When the overall length is greater than a maximum allowable dimension, a rear-end unnecessary portion of the straight tube portion 21 is cut for adjustment. Desired dimensions can be imparted to the projecting mouth portion, etc.

FIG. 4



**PARTIAL EUROPEAN SEARCH REPORT**

Application Number

under Rule 62a and/or 63 of the European Patent Convention.
This report shall be considered, for the purposes of
subsequent proceedings, as the European search report

EP 10 25 0011

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
X	JP 2 853015 B2 (TSUKIBOSHI MFG) 3 February 1999 (1999-02-03)	1	INV. F23Q7/00
Y	* abstract; figures 1A-2J * * paragraphs [0001], [0014] - [0018], [0021] - [0034] *	4	
Y	JP H11 294769 A (NGK SPARK PLUG CO) 29 October 1999 (1999-10-29)	4	
A	* abstract; figures 1-8 * * paragraph [0040] *	1	
A	JP H03 267615 A (WATANABE PURESU SEISAKUSHIYO Y) 28 November 1991 (1991-11-28) * the whole document *	1,4	
A	JP H06 109248 A (JIDOSHA KIKI CO) 19 April 1994 (1994-04-19) * the whole document *	1,4	TECHNICAL FIELDS SEARCHED (IPC) F23Q

INCOMPLETE SEARCH

The Search Division considers that the present application, or one or more of its claims, does/do not comply with the EPC so that only a partial search (R.62a, 63) has been carried out.

Claims searched completely :

Claims searched incompletely :

Claims not searched :

Reason for the limitation of the search:

see sheet C

Place of search

The Hague

Date of completion of the search

13 December 2017

Examiner

Bejaoui, Amin

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
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E : earlier patent document, but published on, or
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D : document cited in the application
L : document cited for other reasons

& : member of the same patent family, corresponding
document



**INCOMPLETE SEARCH
SHEET C**

Application Number
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Claim(s) completely searchable:
1, 4

Claim(s) not searched:
3, 4

Reason for the limitation of the search:

Rule 62a EPC

**ANNEX TO THE EUROPEAN SEARCH REPORT
ON EUROPEAN PATENT APPLICATION NO.**

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This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report.
The members are as contained in the European Patent Office EDP file on
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Patent document cited in search report	Publication date	Patent family member(s)	Publication date
JP 2853015 B2	03-02-1999	JP 2853015 B2	03-02-1999
		JP H08285280 A	01-11-1996
JP H11294769 A	29-10-1999	JP 3737879 B2	25-01-2006
		JP H11294769 A	29-10-1999
JP H03267615 A	28-11-1991	NONE	
JP H06109248 A	19-04-1994	NONE	

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For more details about this annex : see Official Journal of the European Patent Office, No. 12/82