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(54) Title: METHOD FOR FORMING AN ELECTRODE FOR A SPARK PLUG

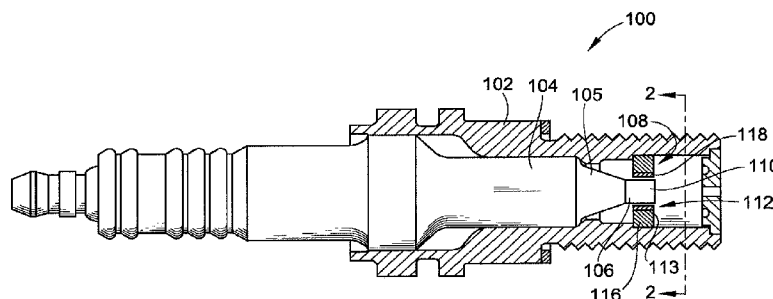


FIG. 1

(57) Abstract: A method of forming an electrode for a spark plug is provided. The method includes machining locating holes within a blank material, inserting a rod of a different material into the locating holes and brazing the rod to the blank. An electrode receiving aperture is machined into the blank. The step of machining the aperture exposes a surface of the rod to form a contact portion of the electrode.

INTERNATIONAL SEARCH REPORT

International application No.
PCT/US2010/048453**A. CLASSIFICATION OF SUBJECT MATTER*****H01T 13/54(2006.01)i, H01T 13/32(2006.01)i***

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

H01T 13/54; H01T 13/20; H01T 13/50; H01T 13/08; B21K 21/08; H01T 21/02

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Korean utility models and applications for utility models

Japanese utility models and applications for utility models

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

eKOMPASS(KIPO internal) & Keywords:a spark plug, annular base portion, a support portion, a contact portion, method of forming an electrode for a spark plug, holes within a blank material, rod, aperture

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X A	EP 1976081 A2 (NGK SPARK PLUG COMPANY LIMITED) 01 October 2008 See abstract; claim 7 and figures 1, 2.	1, 12 2-11, 13-20
A	EP 1965475 A1 (NGK SPARK PLUG CO., LTD.) 03 September 2008 See abstract; claim 1 and figures 1-7.	1-20
A	EP 1441427 A1 (NGK SPARK PLUG CO., LTD.) 28 July 2004 See abstract; claim 1 and figures 1-4.	1-20
A	EP 1950856 A1 (NGK SPARK PLUG CO., LTD.) 30 July 2008 See abstract; claim 1 and figures 1-4.	1-20

☐ Further documents are listed in the continuation of Box C.☒ See patent family annex.

* Special categories of cited documents:

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"&" document member of the same patent family

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INTERNATIONAL SEARCH REPORT

Information on patent family members

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Patent document cited in search report	Publication date	Patent family member(s)	Publication date
EP 1976081 A2	01.10.2008	CN 101276996 A	01.10.2008
		CN 101276996 A	01.10.2008
		CN 101276996 C0	01.10.2008
		JP 04-413973 B2	27.11.2009
		JP 2008-277257 A	13.11.2008
		JP 2008-277284 A	13.11.2008
		JP 2009-224344 A	01.10.2009
		JP 2009-224345 A	01.10.2009
		KR 10-1005694 B1	05.01.2011
		US 2008-0238283 A1	02.10.2008
		US 2011-0037373 A1	17.02.2011
		US 7839065 B2	23.11.2010
EP 1965475 A1	03.09.2008	DE 602008000150 D1	05.11.2009
		EP 1965475 B1	23.09.2009
		JP 04-296202 B2	17.04.2009
		JP 2008-210681 A	11.09.2008
		JP 2008-210681 A	11.09.2008
		JP 4296202 B2	15.07.2009
		US 2008-0203882 A1	28.08.2008
		US 7914353 B2	29.03.2011
EP 1441427 A1	28.07.2004	DE 602004012002 D1	10.04.2008
		DE 602004012002 T2	19.02.2009
		EP 1441427 B1	27.02.2008
		JP 04-342289 B2	17.07.2009
		JP 2004-247282 A	02.09.2004
		US 2004-0145290 A1	29.07.2004
		US 7172483 B2	06.02.2007
EP 1950856 A1	30.07.2008	CN 101346859 A	14.01.2009
		CN 101346859 A	14.01.2009
		JP W020-071056 95A1	20.09.2007
		US 2009-0189502 A1	30.07.2009
		US 2009-189502 A1	30.07.2009
		US 2011-0012499 A1	20.01.2011
		US 7896720 B2	01.03.2011
		WO 2007-105695 A1	20.09.2007