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(54) **PORTABLE PLASMA JET HAND TOOL**

(57) A portable plasma jet hand tool for gliding arc type of plasma jets is provided which comprises a casing (12), a handle (14), a power supply (16), a high voltage generator (18) configured to draw power from the power supply (16). The high voltage generator (18) is configured to connect to at least one pair of opposing electrodes (30a, 30b) in an inner bore (28) of a nozzle (26) attached to the casing (12). An at least partially integrated, gas source (20) is attached to or integrated in the casing of the hand tool. The gas source (20) is connected to a gas delivery channel (22) within the casing (12). The gas source (20) may comprises an air source which is configured to provide gas via the gas delivery channel (22) into the inner bore (28) when the nozzle (26) is attached to the casing (12). The voltages applied by the high voltage generator to each pair of electrodes (30a, 30b) generates an electric field across the inner bore (28) of the nozzle and causes an electrical discharge of the gas or air in the nozzle so that it emerges from the nozzle as a plasma jet. The nozzle (26) may be changed for a nozzle for a different type of plasma discharge in some embodiments, to allow the tool to be easily reconfigured for a variety of different uses. In some embodiments, the tool is configured to provide at least a gliding arc-type plasma jet discharge which advantageously does not require a hose connection to an external working gas source as air or an internal gas canister may be used.

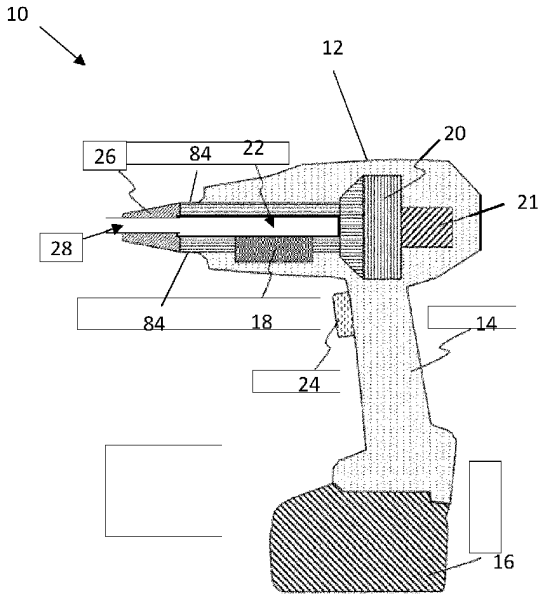

Figure 1

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EUROPEAN SEARCH REPORT

Application Number
EP 23 15 4066

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~~The present search report has been drawn up for all claims~~

Place of search	Date of completion of the search	Examiner
The Hague	14 June 2023	Clemente, Gianluigi

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
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A	FRIDMAN A ET AL: "Gliding arc gas discharge", PROGRESS IN ENERGY AND COMBUSTION SCIENCE, ELSEVIER SCIENCE PUBLISHERS, AMSTERDAM, NL, vol. 25, no. 2, 1 April 1998 (1998-04-01), pages 211-231, XP004155461, ISSN: 0360-1285, DOI: 10.1016/S0360-1285(98)00021-5 * figure 1 * * page 213, left-hand column, paragraph 4 *	1	TECHNICAL FIELDS SEARCHED (IPC)
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Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
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TECHNICAL FIELDS SEARCHED (IPC)

~~The present search report has been drawn up for all claims~~

1

Place of search	Date of completion of the search	Examiner
The Hague	14 June 2023	Clemente, Gianluigi

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CLAIMS INCURRING FEES

The present European patent application comprised at the time of filing claims for which payment was due.

☐ Only part of the claims have been paid within the prescribed time limit. The present European search report has been drawn up for those claims for which no payment was due and for those claims for which claims fees have been paid, namely claim(s):

☐ No claims fees have been paid within the prescribed time limit. The present European search report has been drawn up for those claims for which no payment was due.

LACK OF UNITY OF INVENTION

The Search Division considers that the present European patent application does not comply with the requirements of unity of invention and relates to several inventions or groups of inventions, namely:

see sheet B

☐ All further search fees have been paid within the fixed time limit. The present European search report has been drawn up for all claims.

☐ As all searchable claims could be searched without effort justifying an additional fee, the Search Division did not invite payment of any additional fee.

☐ Only part of the further search fees have been paid within the fixed time limit. The present European search report has been drawn up for those parts of the European patent application which relate to the inventions in respect of which search fees have been paid, namely claims:

☒ None of the further search fees have been paid within the fixed time limit. The present European search report has been drawn up for those parts of the European patent application which relate to the invention first mentioned in the claims, namely claims:

1-13, 15

☐ The present supplementary European search report has been drawn up for those parts of the European patent application which relate to the invention first mentioned in the claims (Rule 164 (1) EPC).

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LACK OF UNITY OF INVENTION
SHEET B

Application Number
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The Search Division considers that the present European patent application does not comply with the requirements of unity of invention and relates to several inventions or groups of inventions, namely:

1. claims: 1-13, 15

Plasma device for a gliding arc-type plasma

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2. claim: 14

Universal Nozzle for plasma devices with sensor

ANNEX TO THE EUROPEAN SEARCH REPORT ON EUROPEAN PATENT APPLICATION NO. EP 23 15 4066

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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14-06-2023

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