503984390 08/30/2016

PATENT ASSIGNMENT COVER SHEET

Electronic Version v1.1 Stylesheet Version v1.2 EPAS ID: PAT4031046

| SUBMISSION TYPE: | NEW ASSIGNMENT |
|-----------------------|----------------|
| NATURE OF CONVEYANCE: | ASSIGNMENT |

CONVEYING PARTY DATA

| Name | Execution Date |
|-------------------|----------------|
| PETER A. TORRIONE | 08/30/2016 |

RECEIVING PARTY DATA

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|--|----------------------------------|--|
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| City: | MCLEAN | |
| State/Country: | VIRGINIA | |
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PROPERTY NUMBERS Total: 1

| Property Type | Number |
|---------------------|----------|
| Application Number: | 15251940 |

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| NAME OF SUBMITTER: | JEANNE E. DUNN |
| SIGNATURE: | /Jeanne E. Dunn/ |
| DATE SIGNED: | 08/30/2016 |

Total Attachments: 3

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PATENT 503984390 REEL: 039589 FRAME: 0295

ASSIGNMENT OF INVENTION

In consideration of the payment by ASSIGNEE to ASSIGNOR of the sum of One Dollar (\$1.00), the receipt of which is hereby acknowledged, and for other good and valuable consideration,

| ASSIGNOR: Inventors who own the invention: | | PETER A. TORRIONE | | | |
|--|---|--------------------------------------|---|---|-----------------------|
| hereby | sells, as: | signs an | d transfers to | | |
| ASSIG | NEE: | | | CoVar Applied Technolog 1495 Chain Bridge Road McLean, VA 22101 USA | ies, Inc. |
| and the | success | ors, assi | gns and legal representatives (complete one of the | | |
| | \boxtimes | the entire right, title and interest | | | |
| | | an und | ivided percent (| %) interest for the U | Inited States and its |
| territorial possessions | | | | | |
| (check the following box, if foreign rights are also to be assigned) | | | ned) | | |
| | and in all foreign countries, including all rights to claim priority, in and to a | | ority, in and to any | | |
| | | and all | improvements which are o | lisclosed in the invention en | titled: |
| SYS | STEM | AND M | METHOD FOR ESTIMA SHAR | TING CUTTING VOLUM KERS | ES ON SHALE |
| Name o | of inver | ntor(s) | PETER A. TORRIONE | | |
| and wh | ich is fo | ound in | (check and complete (a), (a) (37 C.F.R. § 3.21) | b), (c), (d), (e), (f) or (g)) | |
| | (a) | | U.S. patent application exe | ecuted on even date herewith | ı |
| | (b) | | U.S. patent application exe | ecuted on | |
| | (c) | | U.S. provisional application inventor(s) for the above- | onfiled on entitled invention. | naming the above |
| | (d) | $\overline{\checkmark}$ | U.S. Application No. 15/2. | 51,940 filed on August 30, 2 | 016. |

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HOU:3712196.1

PATENT REEL: 039589 FRAME: 0296

| (6) | | International Application No. PCT/ |
|-----|-----|---|
| (1) | 1.1 | U.S. Patent No. issued |
| | 1) | a change of address to which correspondence is to be sent regarding patent maintenance fees is being sent separately. |
| | (u | lso check (g), If foreign application(s) is also being assigned) |
| (g) | X | and any legal equivalent thereof in a foreign country, including the |

and, in and to, all Letters Patent to be obtained for said invention by the above application or any continuation, division, renewal, or substitute thereof, and as to letters patent any reissue or re-examination thereof.

ASSIGNOR hereby covenants that no assignment, sale, agreement or encumbrance has been or will be made or entered into which would conflict with this assignment;

ASSIGNOR further covenants that ASSIGNEE will, upon its request, be provided promptly with all pertinent facts and documents relating to said invention and said Letters Patent and legal equivalents as may be known and accessible to ASSIGNOR and will testify as to the same in any interference, litigation or proceeding related thereto and will promptly execute and deliver to ASSIGNEE or its legal representatives any and all papers, instruments or affidavits required to apply for, obtain, maintain, issue and enforce said application, said invention and said Letters Patent and said equivalents thereof which may be necessary or desirable to carry out the purposes thereof.

| IN WITNESS WHEREOF, I/We | have hereunto set hand and seal this day of |
|--|---|
| | |
| THE STATE OF NORTH CAROLINA | § |
| COUNTY OF | § § § |
| Torrione known to me to be the person w | uthority, on this day personally appeared Peter A. whose name is subscribed to the foregoing instrument, the same for the purposes and consideration therein |
| GIVEN UNDER MY HAND and so | eal of office this, 2016. |
| | |
| | Notary Public in and for the State of North Carolina My Commission Expires: |

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HOU:3712196.1

RECORDED: 08/30/2016