PATENT COOPERATION TREATY

From the
INTERNATIONAL SEARCHING AUTHORITY

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PCT

WRITTEN OPINION OF THE
INTERNATIONAL SEARCHING AUTHORITY

(PCT Rule 43*bis*.1)

Date of mailing *(day/month/year)*	18 OCT 2017
Applicant's or agent's file reference SIE0492PCT	**FOR FURTHER ACTION** See paragraph 2 below

International application No.	International filing date *(day/month/year)*	Priority date *(day/month/year)*
PCT/US17/42503	18 July 2017 (18.07.2017)	21 July 2016 (21.07.2016)

International Patent Classification (IPC) or both national classification and IPC
IPC - G02B 6/00, 6/24, 6/255, 6/36, 6/38, 6/46 (2017.01)
CPC - G02B 6/00, 6/241, 6/255, 6/2553, 6/36, 6/3616, 6/38, 6/3801, 6/3802, 6/3833, 6/3843, 6/3898, 6/46

Applicant THE SIEMON COMPANY

1. This opinion contains indications relating to the following items:

- ☒ Box No. I Basis of the opinion
- ☐ Box No. II Priority
- ☐ Box No. III Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
- ☐ Box No. IV Lack of unity of invention
- ☒ Box No. V Reasoned statement under Rule 43*bis*.1(a)(i) with regard to novelty, inventive step and industrial applicability; citations and explanations supporting such statement
- ☐ Box No. VI Certain documents cited
- ☐ Box No. VII Certain defects in the international application
- ☐ Box No. VIII Certain observations on the international application

2. **FURTHER ACTION**

If a demand for international preliminary examination is made, this opinion will be considered to be a written opinion of the International Preliminary Examining Authority ("IPEA") except that this does not apply where the applicant chooses an Authority other than this one to be the IPEA and the chosen IPEA has notified the International Bureau under Rule 66.1*bis*(b) that written opinions of this International Searching Authority will not be so considered.

If this opinion is, as provided above, considered to be a written opinion of the IPEA, the applicant is invited to submit to the IPEA a written reply together, where appropriate, with amendments, before the expiration of 3 months from the date of mailing of Form PCT/ISA/220 or before the expiration of 22 months from the priority date, whichever expires later.

For further options, see Form PCT/ISA/220.

Name and mailing address of the ISA/US	Date of completion of this opinion	Authorized officer
Mail Stop PCT, Attn: ISA/US Commissioner for Patents P.O. Box 1450, Alexandria, Virginia 22313-1450 Facsimile No. 571-273-8300	14 September 2017 (14.09.2017)	Shane Thomas PCT Helpdesk: 571-272-4300 PCT OSP: 571-272-7774

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Box No. I Basis of this opinion

1. With regard to the **language**, this opinion has been established on the basis of:

   ☒ the international application in the language in which it was filed.

   ☐ a translation of the international application into _____ which is the language of a translation furnished for the purposes of international search (Rules 12.3(a) and 23.1(b)).

2. ☐ This opinion has been established taking into account the **rectification of an obvious mistake** authorized by or notified to this Authority under Rule 91 (Rule 43*bis*.1(a)).

3. ☐ With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, this opinion has been established on the basis of a sequence listing:

   a. ☐ forming part of the international application as filed:

      ☐ in the form of an Annex C/ST.25 text file.

      ☐ on paper or in the form of an image file.

   b. ☐ furnished together with the international application under PCT Rule 13*ter*.1(a) for the purposes of international search only in the form of an Annex C/ST.25 text file.

   c. ☐ furnished subsequent to the international filing date for the purposes of international search only:

      ☐ in the form of an Annex C/ST.25 text file (Rule 13*ter*.1(a)).

      ☐ on paper or in the form of an image file (Rule 13*ter*.1(b) and Administrative Instructions, Section 713).

4. ☐ In addition, in the case that more than one version or copy of a sequence listing has been filed or furnished, the required statements that the information in the subsequent or additional copies is identical to that forming part of the application as filed or does not go beyond the application as filed, as appropriate, were furnished.

5. Additional comments:

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Box No. V **Reasoned statement under Rule 43*bis*.1(a)(i) with regard to novelty, inventive step and industrial applicability; citations and explanations supporting such statement**

1. Statement

Novelty (N)	Claims	1-10	YES
	Claims	NONE	NO
Inventive step (IS)	Claims	1-10	YES
	Claims	NONE	NO
Industrial applicability (IA)	Claims	1-10	YES
	Claims	NONE	NO

2. Citations and explanations:

Claim 1 meets the criteria set out in PCT Article 33(2)-(3), because the prior art does not teach or fairly suggest an optical fiber termination tool comprising: a tool base having a pocket to receive a mechanical splice optical fiber connector; a lever hingedly connected to the tool base, the lever including a wedge; and a slide mounted to the lever, the slide slidable relative to the lever, the slide movable from a first position to a second position to move the wedge from a disengaged position to an engaged position.

In the closest prior art, JP 2006-113152 A to Sumitomo Electric Industries et al. (hereinafter "Sumitomo"), discloses an optical fiber termination tool (optical connector assembly tool 1; abstract) comprising: a tool base having a pocket to receive an optical fiber connector (base 5 having a ferrule housing recess 24 for housing a connector ferrule 4 for an MT connector; abstract; figure 1; page 2, paragraph 2); a lever hingedly connected to the tool base (clamp lever 26 coupled to base 5; abstract; figure 1; page 5, paragraphs 6 and 7), and a slide (slider 8 mounted in groove 7 of base 5; abstract; figures 1 and 2; page 4, paragraph 6), the slide slidable relative to the lever (slider 8 is movable within longitudinal direction of the base 5 along the groove 7 so as to move toward and away from the ferrule holding portion 6; abstract; figures 1 and 2; page 2, paragraph 2), the slide movable from a first position to a second position (slider 8 is movable within longitudinal direction of the base 5 along the groove 7 so as to move toward and away from the ferrule holding portion 6; abstract; figures 1 and 2; page 4, paragraph 6).

Also, JP 2006-58399 A to Fujikura Ltd. Et al. (hereinafter "Fujikura"), discloses an optical fiber termination tool (optical connector assembling tool 10; abstract) comprising: a tool base having a pocket to receive an optical fiber connector (base 20 includes a ferrule holder 21 for holding a ferrule of an MT connector; abstract; figure 1; page 3, paragraph 2); a lever hingedly connected to the tool base (lever 94 coupled to base 20; abstract; figure 1; page 6, paragraph 3), and a slide (slider 90; abstract; figure 1; page 6, paragraph 3), the slide slidable relative to the base (slider 90 is slidingly movable along base 20; abstract), the slide movable from a first position to a second position (slider 90 is slidingly movable along base 20; abstract).

And, US 2010/0316344 A1 to Bylander, J et al. (hereinafter "Bylander") discloses an optical fiber termination tool (assembly tool for installing an optical fiber in an optical connector; title; abstract) comprising: a tool base having a pocket to receive a mechanical splice optical fiber connector (body 100 includes connector mount 102 configured to receive and secure a remote grip optical fiber connector 10 during the fiber termination procedure; figure 1; paragraphs [0046 and 0049]); a lever hingedly connected to the tool base (actuation mechanism 140 (lever) coupled to body 100 as shown; figure 1; paragraph [0050]), the lever including a wedge (actuation mechanism includes a wedge as shown; figures 1 and 3; paragraph [0050]); and a slide mounted to the base (base includes a protrusion setting station 120 comprising activatable cam assembly 123 (slide); figure 1; paragraph [0034-0036]), the slide slidable relative to the lever (cam assembly 123 includes a switch 123A for longitudinal back and forth movement along track 121a; figures 1-2C; paragraph [0037]), the slide movable from a first position to a second position (cam assembly 123 includes a switch 123A for longitudinal back and forth movement along track 121a; figures 1-2C; paragraph [0037]).

Sumitomo, Fujikura, Bylander, and the references of record fail to disclose a tool base having a pocket to receive a mechanical splice optical fiber connector; the lever including a wedge; and a slide mounted to the lever, the slide movable from a first position to a second position to move the wedge from a disengaged position to an engaged position. It would not have been obvious to one of ordinary skill in the art at the time the invention was made to have employed this system, because the references taken solely, or in combination, fail to provide the required limitations, and modification of any complementary combination of the references of record would be impermissible and not provide any advantages over the present application. Further, while Sumitomo, Fujikura, and Bylander each disclose a majority of the claimed limitations, each fails to disclose wherein the slide moves along the lever and actuates the wedge to complete the optical fiber termination. Sumitomo and Fujikura each fail to disclose a wedge attached to the lever and the addition thereof, especially a movable wedge, would not have been obvious as each lever of Sumitomo and Fujikura is able to accomplish its function without said wedge. Bylander on the other hand does include a wedge attached to the lever. However Bylander still fails to meet the crucial limitation of the slide interacting with the lever and the wedge, and is incompatible with a system accomplishing the claimed limitations as the slide and lever of Bylander are disposed apart from one another on the base.

Claims 2-9 meet the criteria set out in PCT Article 33(2)-(3), because of their dependency on claim 1

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Supplemental Box

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-***-Continued from Box V: Citations and Explanations-***-

Claim 10 meets the criteria set out in PCT Article 33(2)-(3), because the prior art does not teach or fairly suggest a method for terminating an optical fiber to a mechanical splice optical fiber connector using an optical fiber termination tool comprising a tool base having a pocket to receive the mechanical splice optical fiber connector, a lever hingedly connected to the tool base, the lever including a wedge and a slide mounted to the lever, the slide slidable relative to the lever, the slide movable from a first position to a second position to move the wedge from a disengaged position to an engaged position, the method comprising: moving the lever to an open position; placing the mechanical splice optical fiber connector in the pocket; moving the lever to a closed position; moving the slide from the first position to the second position; inserting an optical fiber into the mechanical splice optical fiber connector; moving the slide from the second position to the first position; and moving the lever to the open position.

In the closest prior art, Sumitomo discloses a method for terminating an optical fiber to optical fiber connector using an optical fiber termination tool (optical connector assembly tool 1; abstract) comprising a tool base having a pocket to receive the optical fiber connector (base 5 having a ferrule housing recess 24 for housing a connector ferrule 4 for an MT connector; abstract; figure 1; page 2, paragraph 2), a lever hingedly connected to the tool base (clamp lever 26 coupled to base 5; abstract; figure 1; page 5, paragraphs 6 and 7), and a slide (slider 8 mounted in groove 7 of base 5; abstract; figures 1 and 2; page 4, paragraph 6), the slide slidable relative to the lever (slider 8 is movable within longitudinal direction of the base 5 along the groove 7 so as to move toward and away from the ferrule holding portion 6; abstract; figures 1 and 2; page 4, paragraph 6), the slide movable from a first position to a second position (slider 8 is movable within longitudinal direction of the base 5 along the groove 7 so as to move toward and away from the ferrule holding portion 6; abstract; figures 1 and 2; page 4, paragraph 6), the method comprising: moving the lever to an open position (lever 26 is moved to the open position; figure 12D; page 8, paragraph 2); placing the optical fiber connector in the pocket (base 5 having a ferrule housing recess 24 for housing a connector ferrule 4 for an MT connector; abstract; figure 1; page 2, paragraph 2); moving the lever to a closed position (clamp lever 26 is moved to a locked state; figure 10; page 6, paragraph 2); moving the slide from the first position to the second position (slider 8 is movable within longitudinal direction (from first to second and vice versa) of the base 5 along the groove 7 so as to move toward and away from the ferrule holding portion 6; abstract; figures 1 and 2; page 4, paragraph 6); inserting an optical fiber into the optical fiber connector (optical fiber is inserted into the connector ferrule; figure 13; page 9, paragraph 5); moving the slide from the second position to the first position (slider 8 is movable within longitudinal direction (from first to second and vice versa) of the base 5 along the groove 7 so as to move toward and away from the ferrule holding portion 6; abstract; figures 1 and 2; page 4, paragraph 6); and moving the lever to the open position (lever 26 is moved to the open position; figure 12D; page 8, paragraph 2).

Also, Fujikura discloses an optical fiber termination tool (optical connector assembling tool 10; abstract) comprising: a tool base having a pocket to receive an optical fiber connector (base 20 includes a ferrule holder 21 for holding a ferrule of an MT connector; abstract; figure 1; page 3, paragraph 2); a lever hingedly connected to the tool base (lever 94 coupled to base 20; abstract; figure 1; page 6, paragraph 3), and a slide (slider 90; abstract; figure 1; page 6, paragraph 3), the slide slidable relative to the base (slider 90 is slidingly movable along base 20; abstract), the slide movable from a first position to a second position (slider 90 is slidingly movable along base 20; abstract).

And Bylander discloses a method for terminating an optical fiber to a mechanical splice optical fiber connector using an optical fiber termination tool (assembly tool for installing an optical fiber in an optical connector; title; abstract) comprising a tool base having a pocket to receive the mechanical splice optical fiber connector (body 100 includes connector mount 102 configured to receive and secure a remote grip optical fiber connector 10 during the fiber termination procedure; figure 1; paragraphs [0046 and 0049]), a lever hingedly connected to the tool base (actuation mechanism 140 (lever) coupled to body 100 as shown; figure 1; paragraph [0050]), the lever including a wedge (actuation mechanism includes a wedge as shown; figures 1 and 3; paragraph [0050]) and a slide mounted to the base (base includes a protrusion setting station 120 comprising activatable cam assembly 123 (slide); figure 1; paragraph [0034-0036]), the slide slidable relative to the lever (cam assembly 123 includes a switch 123A for longitudinal back and forth movement along track 121a; figures 1-2C; paragraph [0037]), the slide movable from a first position to a second position (cam assembly 123 includes a switch 123A for longitudinal back and forth movement along track 121a; figures 1-2C; paragraph [0037]), the method comprising: moving the lever to an open position (actuation mechanism 140 is configured to move between an open position and a closed position; figure 1; paragraph [0050]); placing the mechanical splice optical fiber connector in the pocket (body 100 includes connector mount 102 configured to receive and secure a remote grip optical fiber connector 10 during the fiber termination procedure; figure 1; paragraphs [0046 and 0049]); moving the lever to a closed position (actuation mechanism 140 is configured to move between an open position and a closed position; figure 1; paragraph [0050]); moving the slide from the first position to the second position (cam assembly 123 includes a switch 123A for longitudinal back and forth movement (from first to second position and vice versa) along track 121a; figures 1-2C; paragraph [0037]); inserting an optical fiber into the mechanical splice optical fiber connector (prepared terminal end of the optical fiber is inserted into and through the connector; paragraph [0013]); moving the slide from the second position to the first position (cam assembly 123 includes a switch 123A for longitudinal back and forth movement (from first to second position and vice versa) along track 121a; figures 1-2C; paragraph [0037]); and moving the lever to the open position (actuation mechanism 140 is configured to move between an open position and a closed position; figure 1; paragraph [0050]).

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Sumitomo, Fujikura, Bylander, and the references of record fail to disclose a method for terminating an optical fiber to a mechanical splice optical fiber connector using an optical fiber termination tool comprising a tool base having a pocket to receive the mechanical splice optical fiber connector, a slide mounted to the lever, the slide movable from a first position to a second position to move the wedge from a disengaged position to an engaged position, the method comprising: placing the mechanical splice optical fiber connector in the pocket; inserting an optical fiber into the mechanical splice optical fiber connector. It would not have been obvious to one of ordinary skill in the art at the time the invention was made to have employed this method, because the references taken solely, or in combination, fail to provide the required limitations, and modification of any complementary combination of the references of record would be impermissible and not provide any advantages over the present application. Further, while Sumitomo, Fujikura, and Bylander each disclose a majority of the claimed limitations, each fails to disclose wherein the slide moves along the lever and actuates the wedge to complete the optical fiber termination. Sumitomo and Fujikura each fail to disclose a wedge attached to the lever and the addition thereof, especially a movable wedge, would not have been obvious as each lever of Sumitomo and Fujikura is able to accomplish its function without said wedge. Bylander on the other hand does include a wedge attached to the lever. However Bylander still fails to meet the crucial limitation of the slide interacting with the lever and the wedge, and is incompatible with a system accomplishing the claimed limitations as the slide and lever of Bylander are disposed apart from one another on the base.

Claims 1-10 have industrial applicability as defined by PCT Article 33(4) because the subject matter can be made or used in industry.