

PATENT COOPERATION TREATY

PCT

INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY

(Chapter II of the Patent Cooperation Treaty)

(PCT Article 36 and Rule 70)

Applicant's or agent's file reference I60006PCT1	FOR FURTHER ACTION		See Form PCT/IPEA/416
International application No. PCT/IB2015/058341	International filing date (<i>day/month/year</i>) 29. Oct. 2015 (29. 10. 2015)	Priority date (<i>day/month/year</i>) 31. Oct. 2014 (31. 10. 2014)	
International Patent Classification (IPC) or national classification and IPC F16L 13/14 (2006. 01) i			
Applicant KING INDUSTRIAL LIMITED			

1. This report is the international preliminary examination report, established by this International Preliminary Examining Authority under Article 35 and transmitted to the applicant according to Article 36.

2. This **REPORT** consists of a total of 4 sheets, including this cover sheet. 5 ▲

3. This report is also accompanied by **ANNEXES**, comprising:

a. ☒ (*sent to the applicant and to the International Bureau*) a total of 5 sheets, as follows:

☒ sheets of the description, claims and/or drawings which have been amended and/or sheets containing rectifications authorized by this Authority, unless those sheets were superseded or cancelled, and any accompanying letters (see Rules 46.5, 66.8, 70.16, 91.2, and Section 607 of the Administrative Instructions).

☐ superseded sheets and any accompanying letters, where this Authority either considers that the superseding sheets contain an amendment that goes beyond the disclosure in the international application as filed, or the superseding sheets were not accompanied by a letter indicating the basis for the amendments in the application as filed, as indicated in item 4 of Box No. I and the Supplemental Box (see Rule 70.16(b)).

b. ☐ (*sent to the International Bureau only*) a total of (indicate type and number of electronic carrier(s)) _____ containing a sequence listing, in electronic form only, as indicated in the Supplemental Box Relating to Sequence Listing (see paragraph 3*bis* of Annex C of the Administrative Instructions).

4. This report contains indications relating to the following items:

☒	Box No. I	Basis of the report
☐	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 Article 35(2) with regard to novelty, inventive step or 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

Date of submission of the demand 01. Jun. 2016 (01. 06. 2016)	Date of completion of this report 13. Feb. 2017 (13. 02. 2017)
STATE INTELLECTUAL PROPERTY OFFICE OF THE P.R.CHINA(IPEA/CN) 6,Xitucheng Rd., Jimen Bridge, Haidian District, Beijing 100088 Facsimile No. (86-10)62019451	Authorized officer FENG, Shuo Telephone No.: (86-10)01062413134

INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY

International application No.
PCT/IB2015/058341

Box No. I Basis of the report

1. With regard to the **language**, this report is based on:

- ☒ 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))
- ☐ publication of the international application (Rule 12.4(a))
- ☐ international preliminary examination (Rules 55.2(a) and/or 55.3(a))

2. With regard to the **elements** of the international application, this report is based on *(replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to this report)*:

- ☒ the international application as originally filed/furnished

☐ the description:	pages	_____	as originally filed/furnished
	pages	_____	received by this Authority on _____
☐ the claims:	pages	_____	as originally filed/furnished
	pages	_____	as amended (together with any statement) under Article 19
	pages	_____	received by this Authority on _____
☐ the drawings:	pages	_____	as originally filed/furnished
	pages	_____	received by this Authority on _____

- ☐ a sequence listing - see Supplemental Box Relating to Sequence Listing.

3. ☐ The amendments have resulted in the cancellation of:

- ☐ the description, pages _____
- ☐ the claims, Nos. _____
- ☐ the drawings, sheets/figs _____
- ☐ the sequence listing (*specify*) _____

4. ☐ This report has been established as if (some of) the amendments annexed to this report and listed below had not been made, since they have been considered to go beyond the disclosure as filed, as indicated in the Supplemental Box (Rule 70.2(c) and (c-bis)).

- ☐ the description, pages _____
- ☐ the claims, Nos. _____
- ☐ the drawings, sheets/figs _____
- ☐ the sequence listing (*specify*): _____

5. ☐ This report has been established taking into account the **rectification of an obvious mistake** authorized by or notified to this Authority under Rule 91(Rule 70.2(e)).

6. ☒ Supplementary international search report(s) from Authority(ies) 01.Jun.2016(01.06.2016) Have been received and taken into account in drawing up this report(Rule 45bis.8(b)and(c)).

* *If item 4 applies, some or all of those sheets may be marked "superseded."*

INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY

International application No.
PCT/IB2015/058341

Box No. V Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement:

Novelty (N)	Claims <u>3, 6, 8, 14</u>	YES
	Claims <u>1, 2, 4, 5, 7, 9-13, 15-20</u>	NO
Inventive step (IS)	Claims <u>None</u>	YES
	Claims <u>1-20</u>	NO
Industrial applicability (I)	Claims <u>1-20</u>	YES
	A) Claims <u>None</u>	NO

2. Citations and explanations (Rule 70.7)

Cited documents:

D1: US6450553B1;

D2: US2011204624A1;

D3: EP0710793A1;

D4: US2008303277A1

I Novelty

D1 is the closest prior art and discloses (see column 3, line 58 to column 7, line 16 and figures 1-5): Fitting 10 for connecting to a tubular element 14 (and the corresponding tubing connection and connecting method) having a first end section comprising at least one first connection element, wherein the diameter of at least a part of the first connection element can be reduced in a radial direction in order to produce a connection; the first connection element comprises at least one first hook element configured to be connected in force-fit and form-fit manner to at least one second crimp formed on the outer surface of the tubular element 14, when the diameter of at least a part of the first connection element is reduced. Therefore, all the features of one subject-matter of claim 1 are already known from D1. With the same reason, one subject-matter of claim 10 or 16 has already known from D1.

The other subject-matters of claims 1, 10 and 16 are: the first connection element comprises at least one first hook element and/or at least one first crimp; in force-fit and/or form-fit manner; the tubular element comprises at least one second crimp and/or at least one second hook element; at least one first hook element and/or at least one first crimp of a first connection element of the fitting and/or at least one securing element is/are deformed to engage at least one second crimp and/or at least one second hook element formed on the surface of the tubular element.

Moreover, D2 (see paragraphs [0024]-[0035], figures 1-7), D3 (see column 2, line

50 to column 4, line 4 and figures 1-3) and D4 (see abstract, figures 1-7) disclose all the features of other subject-matters of claims 1, 10 and 16, respectively. Thus when claim 10 or 16 is according to some claims not new, claims 1, 10 and 16 do not meet the requirements of Article 33(2) PCT.

Dependent claims 2, 4, 5, 7, 9, 11-13, 15 and 17-20 do not appear to contain any additional features which, in combination with the features of any claim to which they refer, and do not meet the requirements of Article 33(2) PCT in respect of novelty:

claims 2, 4, 5, 9, 17: D1 (figure 5); D2 (figure 2); D3 (figures 2 and 3); D4 (figures 2A, 2B, 6A, 6B);

claim 7: D4 (figure 4);

claims 11, 19: D2 (figures 4 and 5); D3 (figures 1-3); D4 (figures 2A, 2B, 6A, 6B);

claims 12, 13: D3 (figure 3);

claim 15: D1 (column 4, lines 12-19); D2 (paragraphs [0024]- [0030]); D3(see column 3, lines 45-54); D4 (abstract);

claim 18: D1 (figure 4); D2 (figure 2); D4 (figures 2A and 6A);

claim 20: D1 (see sliding cap 18 in figures 4 and 5); D2 (paragraph[0032]); D3 (figures 2 and 3); D4 (figures 2A, 2B, 6A, 6B).

And claims 3, 6, 8, 14 depending directly or indirectly on claim 1 or claim 10, but not all the additional features of claims 3, 6, 8, 14 are known from D1, D2, D3 or D4. thus claims 3, 6, 8, 14 meet the requirements of Article 33(2) PCT.

II Inventive Step

Regarding to claim 3, it would have been obvious to the person skilled in the art that the first crimp and the second crimp are connectable to each other by a washer.

Regarding to claim 6, it is well known in the art that the second connection has the similar structure with the first connection for connecting other tubular elements.

Regarding to claim 8, D2, D3 and D4 disclose the liner body, it would have been obvious to the person skilled in the art that at least one liner body and the fitting have some connection elements with respect to each other.

Regarding to claim 14, it is well known in the art that the wall thickness of the tubular and the structure of the crimp or hook should fit the tubing connection. Thus the subject-matters of claims 3, 6, 8, 14 are obvious, and do not meet the requirements of Article 33(3) PCT.

III Industrial Applicability

The invention of claims 1-20 can find industrial applicability in the technical field of tubing connection, and thus meet the requirements of Article 33(4) PCT.

IV About the Arguments

The applicant argues that the fitting element of D1 leads to a weakening of the structure of the pipe, and D1 does not show a constant wall thickness in the area of the indentations.

However, according to the claims 1-13 and 15-20 of the present application, non description about "wall thickness" has appeared, "wall thickness " is

mentioned in claim 14 and the description is "mainly constant". D1 discloses a crimp element which has the similar structure with the present application (see figures 9b, 10 and 12b), there is also slight reduction of wall thickness in the area of pressing in the present application. The person skilled in the art would get hints to keep a mainly constant wall thickness in order to avoiding breakage.



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Argument (According to Chapter II)

STATE INTELLECTUAL PROPERTY OFFICE
OF THE P.R. CHINA

Applicant:	King Industrial Limited
Application No.:	PCT/IB/2015/058341
Title:	Fitting for connecting to a tubular element, tubing connection and a method for connecting a fitting to a tubular element
Our Reference:	434758-665005 / I60006PCT

In response to the communication of January 21, 2016 wherewith the international search report and the written opinion of the International Searching Authority have been forwarded:

Hereby preliminary international examination of the above patent application is requested according to Article 31 PCT.

It is requested to base the further examination procedure on application documents in form of the pending main request, comprising the originally filed application documents.

A. Main request

Patentability

With respect to the alleged missing novelty and alleged missing inventive step of the claimed subject-matter in form of the claims 1 to 20 as originally filed the applicant has carefully

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analyzed the arguments given in the written opinion but respectfully states that they are not convincing.

According to the preamble of claim 1, which is especially based on the state of the art known from US 6,450,553 B1 (D1), the claimed subject-matter is directed to a

fitting for connecting to a tubular element having a first end section comprising at least one first connection element, wherein the diameter of at least a part of the first connection element can be reduced in a radial direction in order to produce a connection.

D1 is the closest prior art, because it corresponds to a similar device as the invention, namely a fitting for joining pipes and tubes.

D1 discloses an axial swage fitting for large bore pipes and tubes. The connection is achieved by means of a swaging ring which is urged axially over a sleeve along an axis, wherein contact portions between the swage sleeve and the swaging ring lead to the situation that the protrusion ring is pressed inwardly into a surface of a pipe section (column 6, lines 20 to 34 of D1). However, D1 has the disadvantage that the deformation of the pipe section leads to a weakening of the pipe in the respective section.

Therefore, the objective technical problem is to improve the fitting for connection so that the structure of the fitting does not become weakened.

This technical problem is solved according to the characterizing part of new claim 1 in that

the first connection element comprises at least one first hook element and/or at least one first crimp configured to be connected in force-fit and/or form-fit manner to at least one second crimp and/or at least one second hook element formed on the outer surface of the tubular element, when the diameter of at least a part of the first connection element is reduced.

The inventors have especially realized that a weakening of the structure in known fittings is caused by a reduction of a wall thickness in the area of a pressing. Such a reduction of a wall thickness can lead to a breakage of the fitting in this area, especially when high pressures are applied and furthermore by the reduction of the wall thickness the resistance of the fitting for a movement of the tube relative to the connection element is reduced as a reduced wall thickness leads to the result that the tubular element might be deformed more easily so that the connection to the connection element gets lost.

D1 does not disclose a crimp element, which means, according to the definition given on page 7, lines 20 to 22, of the description of the present application, an indentation on a wall of the tubular element or the fitting wherein the thickness of the wall is constant over the area of the indentation. Therefore, the fitting element of D1 leads to a weakening of the structure of the pipe when pressing the ring onto the pipe for a connection. Hence, when high pressures are used, especially the tubular element tends to break in the area where the structure is weakened and/or a movement of the connection element relative to the tubular element might occur. Thus subject-matter of claim 1 is new.

Departing from D1, the invention was not obvious to the skilled person, because nothing in D1 points the skilled person towards the solution according to the invention. In particular, figure 5 does not show a constant wall thickness in the area of the indentations. This is true since the convex-shaped pipe deformation 72 at the inner surface of the pipe has the reference sign “alpha” while the concave-shaped deformations at the outer surface (produced by 30a) of the pipe has no reference sign.

Therefore, the disclosure of D1 does not even suggest a constant wall thickness. Because if this feature would be realized by D1, figure 5 would carry references which indicate that the concave-shaped deformations at the outer surface of the wall is complementary to the convex-shape pipe deformation at the inner surface (i.e. would also carry the reference “alpha”). However, in absence of said reference for the concave-shaped pipe deformation the person skilled in the art would not get any hints that the pipe exhibits a constant wall thickness in the area of a deformation. Moreover, the person skilled in the art is lead away

since only deformations at the inner surface are existing. Hence, nothing in D1 points the skilled person towards the solution according to the invention. In addition to that, the objective technical problem is not even mentioned in D1. The invention, therefore, not only has the above mentioned advantages over the closest prior art, it also solves the problem which is not even known in the closest prior art. This has to be seen as a strong indication for the existence of an inventive step.

US2011/204624A1(D2) discloses an universal connection socket. However, D2 does not disclose the post-crimp situation. Therefore, D2 cannot point the skilled person towards the solution according to the invention since nothing in D2 discloses anything about the nature of deformation after the crimping process. Also the description of D2 cannot give any hints for a person skilled in the art that a constant wall thickness over the area of indentation is obtained or even that it is preferred that the wall thickness is constant. The subject-matter of new claim 1 is, thus, novel over D2.

D2 could neither alone nor in combination with D1 have prompted the skilled person towards the invention, because D2 does not even deal with a post crimp situation, hence, exhibiting a lack of an essential feature. The skilled person facing the objective technical problem would, therefore, not even have consulted D2. Even if doing so, this would not have prompted him towards the solution according to the invention, because nothing in D2 would have suggested the distinguishing feature.

EP0710793A1 (D3) describes a pipe fitting. However, the connection element (figure 1 of D3) exhibits neither a first hook element, nor a first crimp element. D3, thus, describes a different subject-matter. The person skilled in the art, therefore, would not have even consulted D3. Even if doing so, the skilled person would not have been able to find anything in D3 that would have prompted him towards the solution according to the invention. Moreover, from the post-crimp situation shown in figure 2 of D3 it is evident that no constant wall thickness is obtained. D3, therefore, leads the person skilled in the art away from the invention.

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US2008/303277A1 (D4) describes a non-bolt joint structure and a method for producing a non-bolt joint structure. However, the subject-matter of D4 is different to the claimed subject-matter of the present application, since the diameter of the pipe is not radial reduced but extended. The person skilled in the art, therefore, would not even take D4 into consideration when looking for a solution of the objective technical problem of the claimed invention.

The invention claimed with claim 1 of the main request is, therefore, based on an inventive step as neither D1, D2, D3 nor D4, or a combination of any of these documents could lead a skilled person to the claimed subject-matter without an undue ex-post-facto analysis or an inventive step.

Hence, the subject-matter of claim 1 of the main request is new and inventive over the known state of the art. Therefore, also the subject-matter of claim 16 of the main request is new and also inventive since it describes a method for producing such a new and inventive connection.

B. Conclusion

The application documents of main request as now on file do fully comply with the requirements of the PCT. In particular they are novel and inventive. It is, thus, expected that a positive examination report will be issued based on the claims of the main request alternatively based on the auxiliary request.

Should the examiner being in charge of the international preliminary examination of above application plan to issue another examination report before issuing a negative preliminary report on patentability it is respectfully requested to give the undersigned the possibility to discuss the claimed subject-matter in a personal consultation, especially in form of a telephone conversation.

Kind regards,

AFD China Intellectual Property Law Office
June 1, 2016

