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Datasheet for the decision of 14 July 2022

Case Number: T 0142/21 - 3.2.01

Application Number: 08166631.5

Publication Number: 2050922

IPC: E21B17/042, F16L15/06

Language of the proceedings: EN

Title of invention:
Thread for roto-percussion drill pipe

Applicant:
Roggan Investments Ltd

Headword:

Relevant legal provisions:
EPC Art. 56, 123(2)

Keyword:
Inventive step - non-obvious combination of known features - (yes)
Amendments - added subject-matter (no)

Decisions cited:

Catchword:

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Case Number: T 0142/21 - 3.2.01

D E C I S I O N
of Technical Board of Appeal 3.2.01
of 14 July 2022

Appellant: (Applicant)	Roggan Investments Ltd 759 Square Victoria, Suite 200 Montreal, QC H2Y 2J7 (CA)
Representative:	Ripamonti, Enrico Giambrocono & C. S.p.A., Via Rosolino Pilo, 19/B 20129 Milano (IT)
Decision under appeal:	**Decision of the Examining Division of the European Patent Office posted on 6 October 2020 refusing European patent application No. 08166631.5 pursuant to Article 97(2) EPC.**

Composition of the Board:

Chairman	G. Pricolo
Members:	A. Wagner
	P. Guntz

Summary of Facts and Submissions

I. The appeal was filed by the applicant against the decision of the examining division to refuse European patent application No. 08166631.5 pursuant to Article 97(2) EPC.

II. In the decision under appeal the examining division concluded that the subject-matter of claim 1 of the sole request did not involve an inventive step in the sense of Article 56 EPC. In order to come to these conclusions the examining division considered the following documents:

D1: DE 198 03 304 A1
D2: DE 100 20 388 A1
D3: GB 1,120,388 A
D4: US 6,120,067 A
D5: US 4,625,814 A
D6: US 4,858,294 A
D7: US 2004/226754 A1
D8: US 2007/029290 A1
D9: DE 3 427 837 A1
D10: US 2005/087581 A1
D11: US 3,268,248 A

III. The appellant (applicant) requests to set aside the decision under appeal and to grant a patent according to the main request, filed with letter dated 4 July 2022, or, as an auxiliary measure, according to the auxiliary request, filed with the statement of grounds of appeal.

IV. Claim 1 of the main request corresponds to claim 1 underlying the impugned decision and reads as follows

(feature numbering a to f adopted from the impugned decision):

A roto-percussion pipe (1), comprising a tubular portion (2) having at its ends a female coupling (3) carrying a female thread and a male coupling (4) carrying a male thread, said male coupling (4) and female coupling (3) enabling the pipe (1) to be connected to other pipes identical therewith to form a roto-percussion drill string of the required length, said threads having at least three starts, the pipe (1) being characterised in that

a) said tubular portion (2) and said couplings (3; 4) are formed as separate pieces, said couplings (3; 4) being welded to said tubular portion (2),

b) wherein said couplings (3; 4) are hardened on their surfaces, a surface hardening treatment being carried out on said couplings (3; 4) before being welded to said tubular portion (2),

c) the hardened portion of the surface of the couplings' portions at which the weld is to be made being removed mechanically subsequent to said treatment to provide the welding machine with a non-treated surface presenting mechanical characteristics suitable for the subsequent welding,

d) wherein said tubular portion (2) is provided with end portions (20), centering profiles are created on the end portions (20) of the tubular portion (2) and on joining surfaces (30, 40) of said couplings (3, 4) to facilitate coaxial mounting of said tubular portion (2) and said couplings (3; 4),

e) wherein said tubular portion (2) is made of N80 special steel that is different from 42CrMo4 steel with which said couplings (3; 4) are made of, and

f) wherein a weld seam made of an AISI 312 stainless steel welding wire is formed between said tubular portion (2) and said couplings (3; 4).

Reasons for the Decision

1. **Article 123(2) EPC**

1.1 The examining division did not raise objection under Article 123(2) EPC against the main request. The Board is satisfied that the amendments made do not introduce added subject-matter:

Claim 1 of the main request combines the features of originally filed claims 1, 3, 4, 8, 9 and 10, wherein the features of original claim 4 are supplemented by features from para. [0010] of the A2-publication of the application and the features of original claim 10 are supplemented by features from para. [0012].

1.2 Even though claim 8 originally referred only to claim 1 and not to claims 3 and 4, the original description, paras. [0008] to [0010], discloses the features of claim 8 (N80 steel for the tubular portion) in combination with the features of claims 3 and 4 (separate portions, surface hardening treatment of the couplings). Details of the thread additionally mentioned in these paragraphs are not inextricably linked to these features.

1.3 Furthermore original claim 10, defining the weld seam and also originally referring only to claim 1, only

make sense in combination with claims 3 and 4, defining the portions that are to be welded. Thus the skilled person unambiguously reads claim 10 in combination with claims 3 and 4.
Regarding the combination of claim 10 (AISI 312) with claim 8 (N80) and claim 9 (42CrMo4) it is noted that the original application discloses only one embodiment having a tubular portion made of N80, couplings made of 42CrMo4 and weld seams formed from AISI 312.

1.4 Claim 2 corresponds to original claim 5. Claims 3 to 6 correspond to original claims 6, 7, 2 and 11.

1.5 Finally, the description is amended to bring it into conformity with the wording of the amended claims and to acknowledge the relevant prior art.

2. **Article 56 EPC**

2.1 The board judges that the subject-matter of claim 1 of the main request involves an inventive step over the cited prior art.

2.2 Closest prior art

2.2.1 The board agrees with the examining division that D1 or D2 are suitable starting points.
D1 (column 3, lines 10 to 19, with figure 1a) and D2 (paragraphs [0008, 0023] with figure 1) disclose the preamble of claim 1.
Both documents are directed to details of the thread of the couplings (see claims of D1, D2) and do not deal with specific materials. Both documents are silent about whether the couplings might be separate parts welded to the tube. Contrary to the appellant's opinion a one piece rod is neither promoted nor preferred.

2.2.2 D3 was also considered by the examining division to be a possible starting point.
The board does not agree. In D3 (figures 1 and 2), the extension rod 10 for a drill rod for percussion drilling is explicitly made in one piece.
The teaching of D3 is to reduce the number of parts in the drill rod (page 2, lines 106 to 109). Advantages, e.g. greater rigidity and less bending, due to the couplings 13, 15 being formed integrally with the tubular portion, are described on page 2, lines 61 to 81. Therefore the skilled person would not be prompted to use couplings that need to be welded to the tube.

2.3 Distinguishing features and objective technical problem

2.3.1 It is undisputed that the claimed subject-matter differs from D1 or D2 in features a to f.

2.3.2 The examining division was of the opinion that the feature combination a to f was a juxtaposition of features and that each feature solved a different partial problem without any synergetic effect (impugned decision, point 1.3).

2.3.3 The board does not agree. Instead the problem formulated by the examining division for feature e, namely (see impugned decision page 4, fourth line) to "*allow use of particular different materials best adapted for the specific function*" constitutes the objective technical problem solved by all features taken in combination.

2.3.4 The solution is to provide separate pieces each from a specific material with specific properties (features a, b, e). The solution has the consequence that the pieces of different materials necessarily have to be connected

in a suitable way to form a drill pipe (features c, d, f).

2.4 **Inventive step**

2.4.1 Starting from D1 or D2, the skilled person knows e.g. from D4 (column 1, lines 59 to 67) or from D5 (figure 11) that the couplings 11, 12 can be formed as separate pieces and then be welded to the tubular portion 14 (feature a). D5 proposes preferably friction welding (D5, column 5, lines 64-68: "*The drill rod extension rod can be seen in FIG. 11 enlarged and partially in section. It is made up of the steel tube 14, at both ends of which threaded parts 11 and 12 are connected by welded joints 13 which are preferably friction-weld joints*."). D4 and D5 both are silent about using different materials for the tube and the couplings.

2.4.2 The idea of making one of the couplings from a material that is different from the material of the tubular portion, is known from D7 (paras. [0016, 0019]). Therein the coupling 6 is case hardened and - as in D5 - joined to the tubular portion 2 by friction welding. D7 (para. [0018]) additionally teaches that, in order to optimise material properties in the friction welding process, it is necessary to exclude the welding zone from the case hardening process .

It is noted that even without referring to D6, D8 or D9 cited in the impugned decision for feature c, the board follows the opinion of the examining division that the skilled person is aware of the fact that the welding zone must not be hardened and that this can be achieved by avoiding hardening in a specific zone or by removing the hardened surface in the welding zone after the

hardening process (feature b, c).

2.4.3 Neither D5 nor D7 mentions any specific material. Thus the skilled person is still confronted with the problem to select suitable materials for the tubular portion and the couplings.

2.4.4 For the tubular portion, the board confirms the opinion of the examining division that steel of grade N80 is a common pipe material in the field of earth or rock drilling, including oil industry, e.g. for well casings.

2.4.5 For the couplings, the examining division did not comment on the material 42CrMo4 (decision, page 4, point 11.4, ad e). D3 (see also point 2.2 of this decision), being the only cited document disclosing a chromium-molybdenum steel, teaches to use this material for the complete extension rod which is made in one piece because "*the above compositions cannot readily be welded*" (page 2, lines 99 to 105). Indeed it is commonly known that 42CrMo4 has a limited weldability. Thus the skilled person is not prompted to use this chromium-molybdenum steel for separate pieces that are intended to be welded (feature e, partly).

2.4.6 Should the skilled person nevertheless select 42CrMo4 for the couplings, the question how to connect the couplings to the tubular portion, still needs to be answered.

2.4.7 D5 and D7 hint the skilled person to use friction welding and not a technique using centering portions and a welding wire according to claim 1 (features d and f).

2.4.8 It might be argued that the skilled person, having in mind that 42CrMo4 can not readily be welded, is motivated to look for an alternative welding technique that is explicitly suitable for welding 42CrMo4 to N80. But even if D10 discloses a technique with centering portions (see paras. [0025], [0043] with figures 8A to 8D: the circumferential outer beveled surface 231 and the inner beveled surface 243 of the components 12, 14 "*tend to self-align themselves (in an axial direction) when they are axially urged together with sufficient force.*") and a welding wire (para. [0047]), features d and f are not obvious as also D10 does not disclose that the described welding technique is suitable for welding 42CrMo4 to N80. The centering profiles disclosed in D11 (figures 2, 3) cited for feature d by the examining division do not change this either.

2.4.9 Finally an AISI 312 stainless steel welding wire, even if commonly known as suitable wire, has to be selected by the skilled person.

2.4.10 Consequently, the board agrees with the appellant that the cited prior art combined with the general knowledge at least does not prompt the skilled person to select 42CrMo4 for the couplings (part of feature e) and to provide centering profiles and a weld seam made of an AISI 312 stainless steel welding wire for the connection to the tubular portion made of N80 (features d, f) as the skilled person has to make several, not obvious selections to arrive at the claimed subject-matter.

2.5 Hence, the requirements of Article 56 EPC are met.

Order

For these reasons it is decided that:

1. The decision is set aside.

2. The case is remitted to the department of first instance with the order to grant a European patent on the basis of the main request filed with letter dated 4 July 2022:

   - Description pages 1, 1A, 2 and 3
   - Claims 1 to 6
   - Figures 1 to 7

The Registrar: The Chairman:

A. Voyé G. Pricolo

Decision electronically authenticated