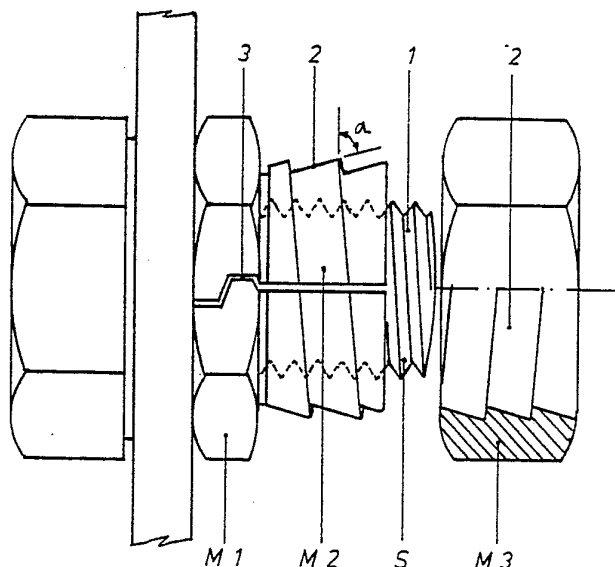




INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(51) International Patent Classification⁴ : F16B 39/12, 37/10	A1	(11) International Publication Number: WO 87/ 07928 (43) International Publication Date: 30 December 1987 (30.12.87)
(21) International Application Number: PCT/NO87/00048 (22) International Filing Date: 15 June 1987 (15.06.87) (31) Priority Application Number: 862444 (32) Priority Date: 19 June 1986 (19.06.86) (33) Priority Country: NO (71)(72) Applicant and Inventor: KOLVEREID, Harald [NO/NO]; Skellefteåveien 22, N-8610 Grubhei (NO). (74) Agent: RUDI, Alf-Petter; Narvik Patentkontor, Box 385, N-8501 Narvik (NO). (81) Designated States: AT (European patent), BE (European patent), CH (European patent), DE (European patent), FR (European patent), GB (European patent), IT (European patent), JP, LU (European patent), NL (European patent), SE (European patent), SU, US.		Published <i>With international search report. In English translation (filed in Norwegian).</i>

(54) Title: COMBI-NUT**(57) Abstract**

Combi-nut (M) for nut/bolt connection where the main objective with the technique used is to enable easy removal of a nut from a severely corroded bolt, combined with the advantage of a supplementary securing of the nut/bolt connection on assembly. The combi-nut consists of three sections (M₁, M₂, M₃), where the main nut (M₁, M₂) is axially split into two halves. On assembly, the two halves are positioned on the thread of the bolt and subsequently held together by tightening the lock nut (M₃) home onto the outer threaded section of the main nut. The torque of the combi-nut is obtained by tightening the main nut and the lock nut together against the object to be bolted. Locking is effected by additional tightening of the lock nut. Removal of the combi-nut is effected by unscrewing the lock nut from the main nut, while the main nut is removed with a light knock on each of the halves, and said halves must therefore not be unscrewed from the bolt.

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COMBI-NUT

The invention consists of a main nut which is split in two axially and has a section for spanner use and a thread. On to the threaded part, a lock nut is tightened. The slot between the two halves of the main nut is stepped (sawtooth-shaped) in parts to enable easy identification of the two halves forming a pair, and also to prevent misalignment on the thread of the bolt.

The nut is designed primarily for use in corrosive environments, and especially for flange assembly of tubing.

The thread between the lock nut and the main nut can have three different designs to suit various requirements.

- a) The thread is cylindrical and may be designed according to metric or UH standards.
- b) The thread is cylindrical, but cut at an angle which makes the main nut lock onto the bolt if one pulls on the lock nut after it has been tightened home against the main nut.
- c) The thread between the nuts is tapered but the design may be varied to give different degrees of locking for the lock nut.

The major advantage of the invention becomes apparent when it becomes necessary to remove the nut from severely corroded bolts, and one can unscrew the lock nut from the main nut without being hampered by rust, and then remove the two halves of the main nut without having to unscrew them from the severely corroded bolt.

Designs b) and c) will, in addition to the above-mentioned advantage, also provide a considerable locking effect between the main nut and the bolt.

Designs a) and b) provide a reinforced construction as tightening of the lock nut will give

support to the main nut since the section for spanner use is clamped between the lock nut and the object to be bolted.

5 The Combi-nut consists of parts M_1, M_2 which constitute the two halves of the main nut, and M_3 which is the lock nut, illustrated on figures 1, 2, 3 and 4. The slot 3 between the two halves of the main nut is partly stepped to enable easy identification of two paired halves, and to prevent misalignment on the thread 1 of the bolt S.

10 The thread 2 between the main nut M_3 and the lock nut M_1, M_2 is cylindrical with a wide profile angle α . See Fig. 1. When the lock nut is tightened home against the main nut, the additional torque will clamp the double-threaded section of the main nut against the bolt, and at the same time the section for spanner use on the main nut is supported.

15 By varying the profile angle α one will be able to obtain various degrees of self-locking effect for the lock nut M_3 .

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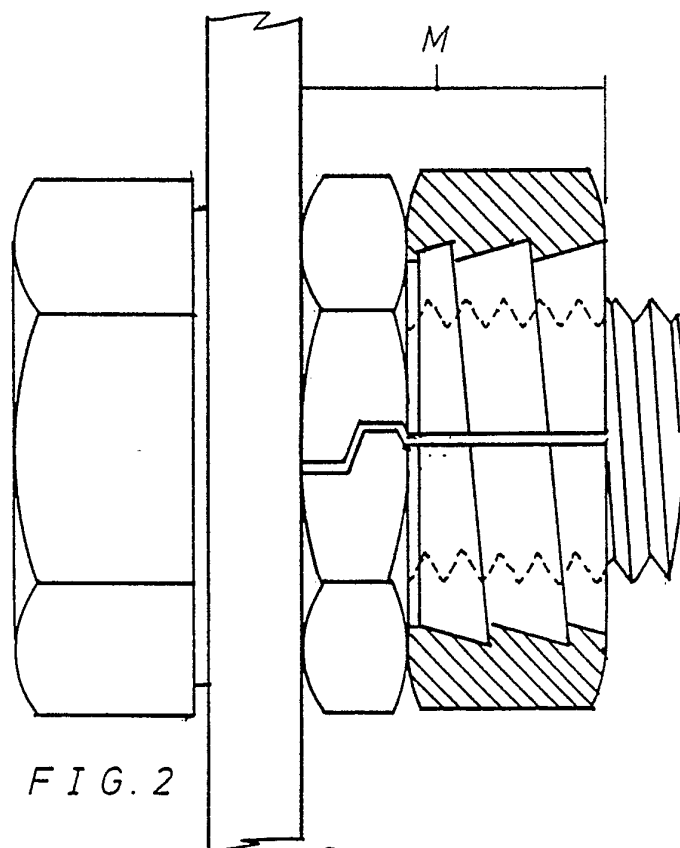
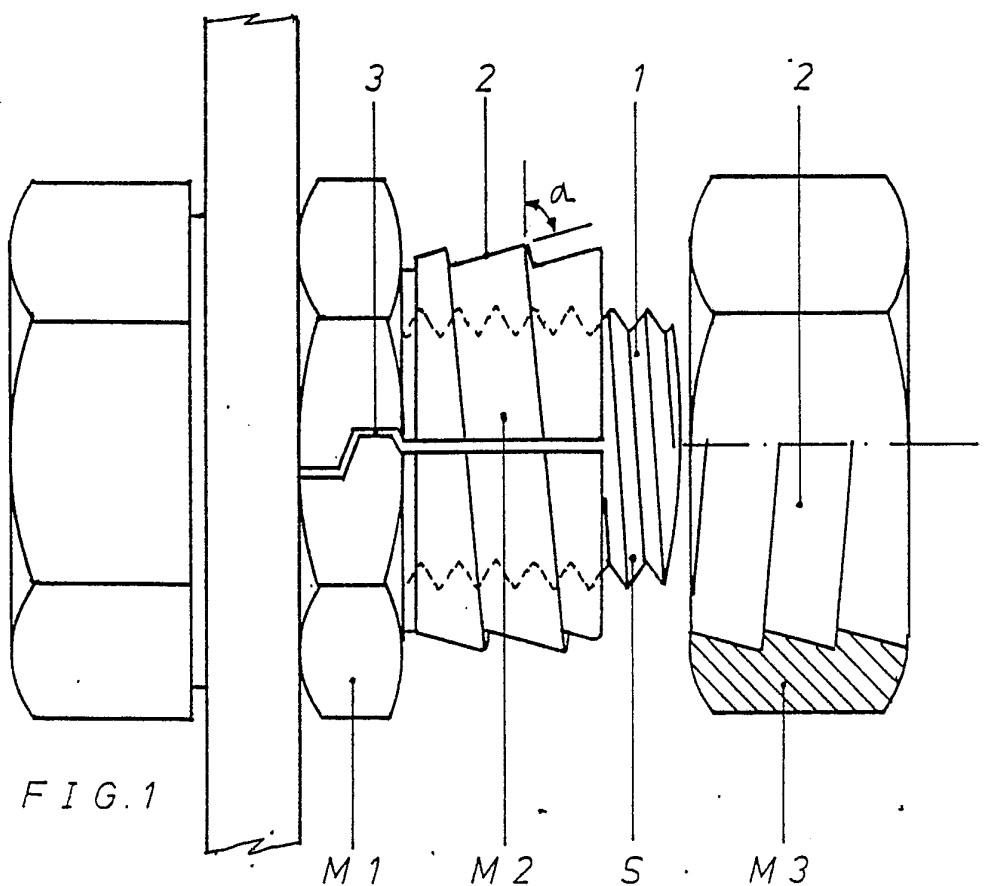
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CLAIMS

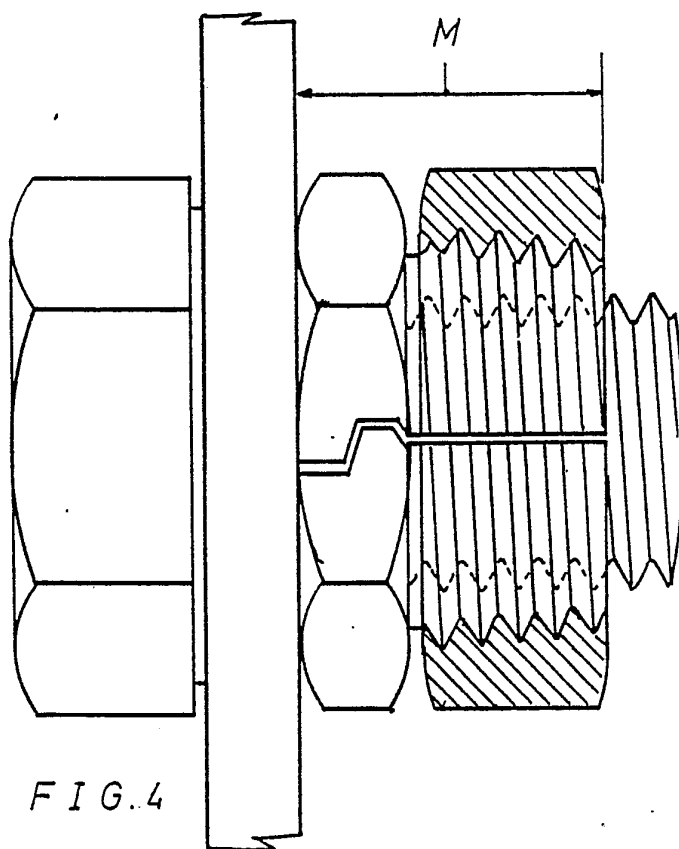
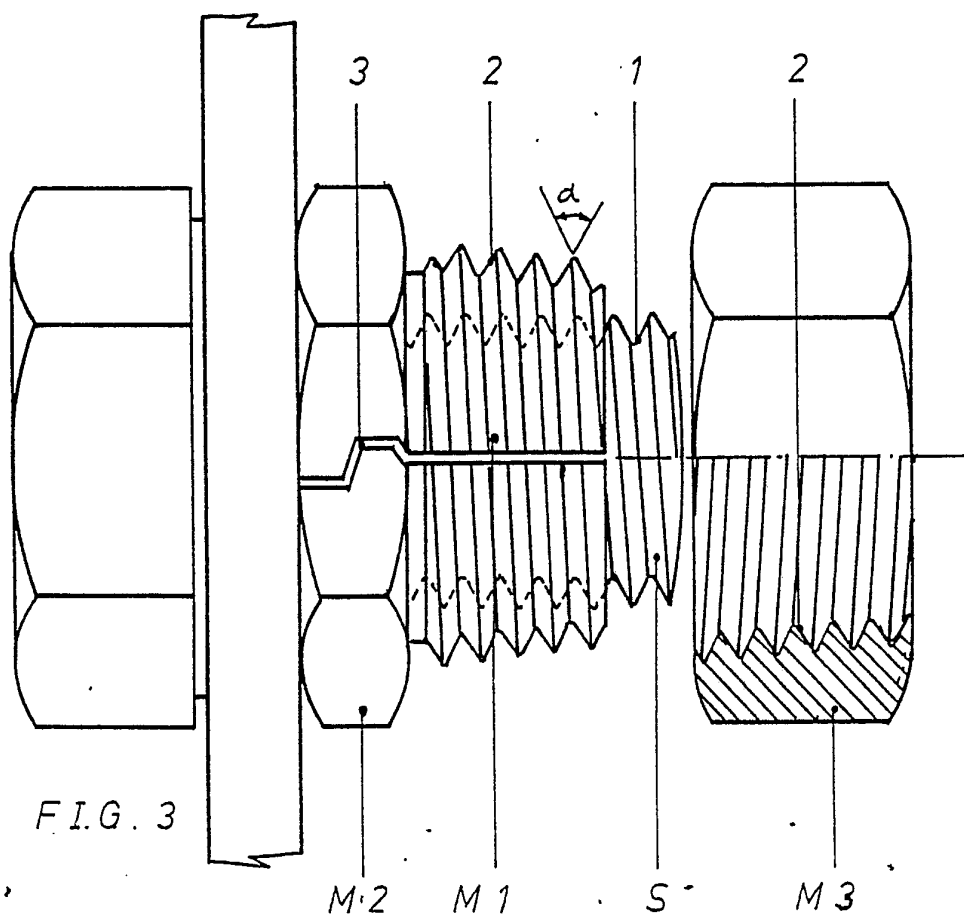
1. Combi-nut (M) with main nut axially divided into two sections (M_1, M_2) and lock nut (M_3) characterized in that the sections of the pair which compose the main nut can, due to the design of the slot (3), easily be identified and oriented in relation to each other, and in that the main nut, on part of its outer periphery, is provided with a thread (2) which, by varying the design of said thread, provides for various degrees of self-locking for the lock nut when said lock nut with its corresponding thread (2) is tightened onto the main nut.
2. Combi-nut (M) according to claim 1, characterized in that the thread (2) between the main nut (M_1, M_2) and the lock nut (M_3) is tapered.
3. Combi-nut (M) according to claim 1, characterized in that the thread (2) between the main nut (M_1, M_2) and the lock nut (M_3) is cylindrical.

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SUBSTITUTE SHEET

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SUBSTITUTE SHEET

INTERNATIONAL SEARCH REPORT

PCT/N087/00048

International Application No

I. CLASSIFICATION OF SUBJECT MATTER (if several classification symbols apply, indicate all) ⁶		
According to International Patent Classification (IPC) or to both National Classification and IPC		
F 16 B 39/12, 37/10		4
II. FIELDS SEARCHED		
Minimum Documentation Searched ⁷		
Classification System	Classification Symbols	
IPC	F 16 B 35/00, 37/00, /08, /10, 39/00, /12, /30	
Nat Cl	47a:7, 12	
US Cl	85: 32, 32.1, 33; 151: 2, 14, 15, 19; .../...	
Documentation Searched other than Minimum Documentation to the Extent that such Documents are Included in the Fields Searched ⁸		
SE, NO, DK, FI classes as above		
III. DOCUMENTS CONSIDERED TO BE RELEVANT ⁹		
Category [*]	Citation of Document, ¹¹ with indication, where appropriate, of the relevant passages ¹²	Relevant to Claim No. ¹³
Y	DE, C, 901 849 (ERNST HEILMANN) 14 January 1954	1, 3
Y	DE, B, 1 144 542 (RUDI NOWAK, HEINZ KIEFER) 28 February 1963	1
Y	DE, A, 1 962 009 (BÜCHEL) 16 June 1971	1, 2
Y	US, A, 609 509 (V.A. JENSEN) 23 August 1898	1
X	US, A, 1 081 239 (C.J. LANTZ) 9 December 1913	1, 2
Y	US, A, 1 082 993 (R.L. BEATTIE) 30 December 1913	1
Y	US, A, 1 352 256 (F.W. ERICKSON) 7 September 1920	1, 3
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IV. CERTIFICATION		
Date of the Actual Completion of the International Search		Date of Mailing of this International Search Report
1987-09-22		1987-09-24
International Searching Authority Swedish Patent Office		Signature of Authorized Officer  Marianne Dickman

FURTHER INFORMATION CONTINUED FROM THE SECOND SHEET

II

Fields Searched (cont).

US C1 285: 34, 89, 92, 386-393;
 411: 190, 259, 263-270, 427, 432,
 433, 436, 437

V. ☐ OBSERVATIONS WHERE CERTAIN CLAIMS WERE FOUND UNSEARCHABLE ¹

This international search report has not been established in respect of certain claims under Article 17(2) (a) for the following reasons:

1. ☐ Claim numbers..... because they relate to subject matter not required to be searched by this Authority, namely:

2. ☐ Claim numbers..... because they relate to parts of the international application that do not comply with the prescribed requirements to such an extent that no meaningful international search can be carried out, specifically:

3. ☐ Claim numbers..... because they are dependent claims and are not drafted in accordance with the second and third sentences of PCT Rule 6.4(a).

VI. ☐ OBSERVATIONS WHERE UNITY OF INVENTION IS LACKING ²

This International Searching Authority found multiple inventions in this international application as follows:

1. ☐ As all required additional search fees were timely paid by the applicant, this international search report covers all searchable claims of the international application.

2. ☐ As only some of the required additional search fees were timely paid by the applicant, this international search report covers only those claims of the international application for which fees were paid, specifically claims:

3. ☐ No required additional search fees were timely paid by the applicant. Consequently, this international search report is restricted to the invention first mentioned in the claims; it is covered by claim numbers:

4. ☐ As all searchable claims could be searched without effort justifying an additional fee, the International Searching Authority did not invite payment of any additional fee.

Remark on Protest

- ☐ The additional search fees were accompanied by applicant's protest.
☐ No protest accompanied the payment of additional search fees.