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(71) Applicant: **Usco S.P.A.**
41100 Modena (IT)

(72) Inventor: **CRISTOFORI, Giulia**
I-41100 MODENA (IT)

(74) Representative: **Eterno, Enrico**
Jacobacci & Partners S.p.A.
Piazza della Vittoria, 11
25122 Brescia (IT)

(54) **WEAR ASSEMBLY FOR EARTH MOVING MACHINE**

(57) Wear assembly (1) comprising a wear tooth (2) comprising a wall (4) that defines a pocket (6) and at least one through hole (8, 8') communicating with the pocket, an adapter (10) with a connection point (12) inserted into the pocket (6) in a removable manner and defining a pin cavity (14) aligned with the through hole (8, 8'), a blocking pin (16) between the tooth (2) and adapter (10), inserted in the through hole (8, 8') and in the pin cavity (14) rotatably and comprising at least a first blocking element (18), and a second blocking element (20, 20') associated to the wear tooth (2) or to the adapter (10).

The elements (18, 20, 20') are mutually arranged in such a way that, through rotation of the blocking pin (16) in a direction, the first blocking element (18) intercepts the second (20, 20') to block the pin in the pin cavity (14). In addition, one of said elements (20, 20') is deformable so that, through a further rotation in the same direction, this element disengages from the other element (18) allowing the extraction of the pin from the cavity.

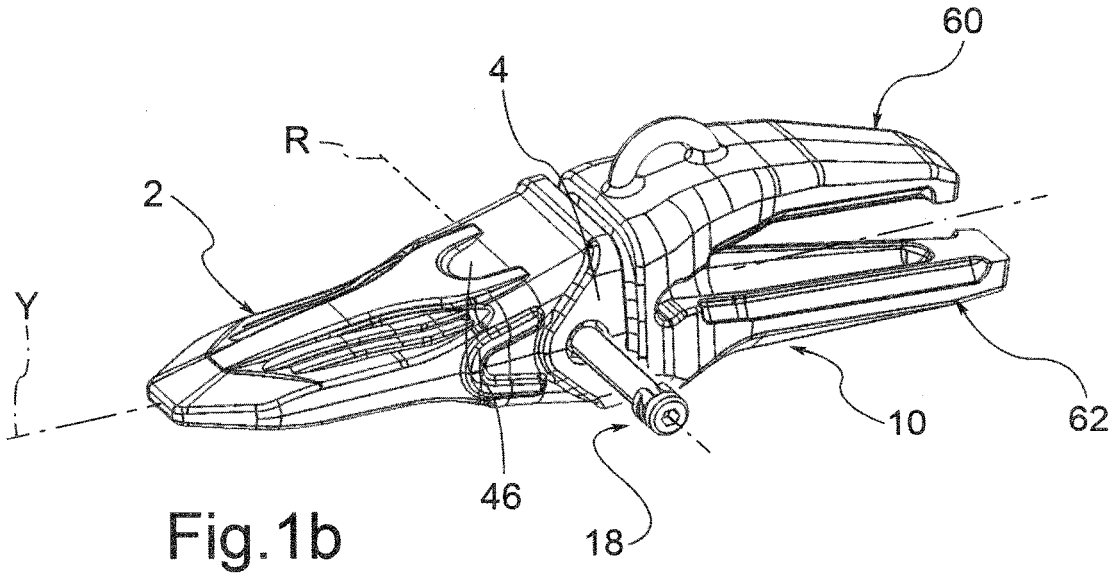

Fig.1b

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EUROPEAN SEARCH REPORT

Application Number
EP 15 19 7043

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
X	US 2012/260540 A1 (GUIMARAES MIGUEL [AU] ET AL) 18 October 2012 (2012-10-18) * paragraph [0088] - paragraph [0136]; figures * * paragraph [0138] - paragraph [0142] *	1-9, 11-15	INV. E02F9/28
X	US 2014/223784 A1 (ENDERSBY TRAVIS [CA] ET AL) 14 August 2014 (2014-08-14) * the whole document *	1,4,5,7, 8,11,12, 14,15	
X	US 5 435 084 A (IMMEL DARRYL R [US]) 25 July 1995 (1995-07-25) * figures 5-10 *	1-9,11, 12,14,15	
A	US 2014/331529 A1 (GUIMARAES MIGUEL [AU] ET AL) 13 November 2014 (2014-11-13) * figure 8 *	1,11-15	
A	US 8 807 901 B1 (LOMBARDO PASQUALE [US] ET AL) 19 August 2014 (2014-08-19) * the whole document *	1	TECHNICAL FIELDS SEARCHED (IPC) E02F
A	US 2014/352181 A1 (CAMPOMANES PATRICK S [US]) 4 December 2014 (2014-12-04) * the whole document *	1	

~~The present search report has been drawn up for all claims~~

Place of search	Date of completion of the search	Examiner
Munich	5 September 2016	Laurer, Michael

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
Y : particularly relevant if combined with another document of the same category
A : technological background
O : non-written disclosure
P : intermediate document

T : theory or principle underlying the invention
E : earlier patent document, but published on, or after the filing date
D : document cited in the application
L : document cited for other reasons

& : member of the same patent family, corresponding document

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Application Number
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CLAIMS INCURRING FEES

The present European patent application comprised at the time of filing claims for which payment was due.

☐ Only part of the claims have been paid within the prescribed time limit. The present European search report has been drawn up for those claims for which no payment was due and for those claims for which claims fees have been paid, namely claim(s):

☐ No claims fees have been paid within the prescribed time limit. The present European search report has been drawn up for those claims for which no payment was due.

LACK OF UNITY OF INVENTION

The Search Division considers that the present European patent application does not comply with the requirements of unity of invention and relates to several inventions or groups of inventions, namely:

see sheet B

☐ All further search fees have been paid within the fixed time limit. The present European search report has been drawn up for all claims.

☐ As all searchable claims could be searched without effort justifying an additional fee, the Search Division did not invite payment of any additional fee.

☒ Only part of the further search fees have been paid within the fixed time limit. The present European search report has been drawn up for those parts of the European patent application which relate to the inventions in respect of which search fees have been paid, namely claims:

1-9, 11-14(completely); 15(partially)

☐ None of the further search fees have been paid within the fixed time limit. The present European search report has been drawn up for those parts of the European patent application which relate to the invention first mentioned in the claims, namely claims:

☐ The present supplementary European search report has been drawn up for those parts of the European patent application which relate to the invention first mentioned in the claims (Rule 164 (1) EPC).

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LACK OF UNITY OF INVENTION
SHEET B

Application Number
EP 15 19 7043

The Search Division considers that the present European patent application does not comply with the requirements of unity of invention and relates to several inventions or groups of inventions, namely:

1. claims: 1-9(completely); 15(partially)

   are directed to the known assembly of independent claim 1 wherein the first blocking elements are a plurality and are angularly staggered and interact with the second blocking elements (claims 2-3) or wherein the second blocking element is positively fitted into the tooth or the adapter (claim 4) or wherein the second blocking element comprises a resilient attachment portion for being seated in the tooth or adapter (claims 5, 6) or a laterally extending protrusion of the first blocking element inhibits translation and rotation of the blocking pin (claims 7, 8) or the second blocking element is inserted in a seat of the wear tooth, facing the tip pocket (claim 9). The resulting technical effects are: Positive fit of the engaging members is further defined. The objective technical problem to solve may be formulated as: Improve engagement of such known assemblies.

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2. claims: 10(completely); 15(partially)

   is directed to the known assembly of independent claim 1 wherein the deformable blocking element has a shape memory (claim 10). The resulting technical effects are: After deformation under a load or through rotation the element regains its original shape and can be reused. The objective technical problem to solve may be formulated as: Improve biasing elements in such installations.

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3. claims: 11-14(completely); 15(partially)

   are directed to the known assembly of independent claim 1 or the subject-matter of independent claim 14 wherein the connection tip is crossed by the pin cavity and the inserted pin comprises a pin head and a pin tip accessible through holes (claims 11-12) or wherein the (accessible) through holes are closed by means of protective hood (claim 13) or wherein the pin cavity is at least partially aligned with the through holes, so as to make the pin head and the pin tip accessible through said through holes (claim 14).The thereto associated technical effect is: The pin may be accessed from both sides of the tooth-adapter assembly, for instance by a setting-tool. The objective technical problem to solve may be formulated as: Improve access of a pin in the known tooth adapter assembly.

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4. claim: 15(partially)

   is directed to the known assembly of independent claim 1 or

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LACK OF UNITY OF INVENTION
SHEET B

Application Number
EP 15 19 7043

The Search Division considers that the present European patent application does not comply with the requirements of unity of invention and relates to several inventions or groups of inventions, namely:

the subject-matter of independent claim 14 wherein the assembly may be used in grab buckets. The resulting technical effects are: Improved tooth assemblies in grab buckets. The objective technical problem to solve may be formulated as: Improve wear tooth assemblies in grab bucket installations.

ANNEX TO THE EUROPEAN SEARCH REPORT ON EUROPEAN PATENT APPLICATION NO. EP 15 19 7043

This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report. The members are as contained in the European Patent Office EDP file on
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05-09-2016

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 2012260540 A1	18-10-2012	AP 3457 A	31-12-2015
		AU 2010330673 A1	29-03-2012
		AU 2010330705 A1	29-03-2012
		AU 2012100453 A4	17-05-2012
		CA 2783698 A1	16-06-2011
		CA 2783709 A1	16-06-2011
		CN 102686811 A	19-09-2012
		CN 102686812 A	19-09-2012
		CN 104018546 A	03-09-2014
		EP 2510160 A1	17-10-2012
		EP 2510162 A1	17-10-2012
		PE 03272013 A1	03-04-2013
		PE 03332013 A1	03-04-2013
		RU 2012126817 A	20-01-2014
		RU 2012126823 A	20-01-2014
		US 2012260539 A1	18-10-2012
		US 2012260540 A1	18-10-2012
		WO 2011069183 A1	16-06-2011
		WO 2011069215 A1	16-06-2011
US 2014223784 A1	14-08-2014	CA 2805398 A1	08-08-2014
		US 2014223784 A1	14-08-2014
US 5435084 A	25-07-1995	AU 675368 B2	30-01-1997
		AU 8040594 A	24-08-1995
		CA 2120087 A1	18-08-1995
		US 5435084 A	25-07-1995
		ZA 9409759 B	18-08-1995
US 2014331529 A1	13-11-2014	AU 2012307065 A1	13-03-2014
		US 2014331529 A1	13-11-2014
		WO 2013033751 A1	14-03-2013
US 8807901 B1	19-08-2014	CA 2908366 A1	13-04-2015
		US 8807901 B1	19-08-2014
US 2014352181 A1	04-12-2014	CN 203891112 U	22-10-2014
		US 2014352181 A1	04-12-2014

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For more details about this annex : see Official Journal of the European Patent Office, No. 12/82