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(54) **QUICK COUPLER**

(57) This invention relates to a coupler (1) for machine accessories, such as for example excavators, the said accessories comprising coupling pins. The coupler (1), for this purpose, has at least two hydraulic cylinders (8) (9). These cylinders are responsible for moving two latches (5) (6) which are connected by at least one connecting arm (10). The said connecting arm (10), in its turn, comprises two hinged bars, one of them having a right-angled geometry and which, at one end, the front

one, is provided with means of articulation with the other hinged bar of the connecting arm (10) and, at the other end, the rear one, a locking plate (11). When positioning the quick coupler (1) on at least two pins (4) (5) of an accessory (3) of a machine, the rear latch (7) holds the rear pin (5) of the accessory thus preventing it from being released. The front latch (6) is then actuated, locking the front pin (4) on the accessory.

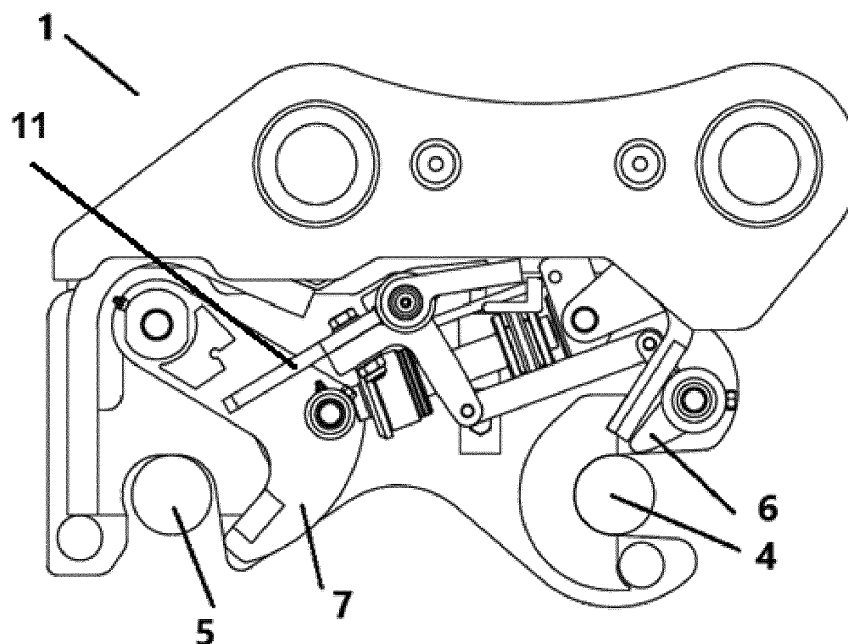


Figure 5

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Description**TECHNICAL FIELD OF THE INVENTION**

[0001] This invention relates to a quick coupler, particularly to quick couplers with safety system, and even more particularly to quick couplers with safety system intended for excavators.

STATE OF THE ART OF THE INVENTION

[0002] It is well known that a coupler has a hydraulically operated latching hook to engage with the pins of an accessory, for example a bucket, to the arm of an excavator. Such couplers usually include a safety mechanism to prevent the accessory from being disengaged from the coupler in the event of hydraulic failure.

[0003] The patent KR101777739 describes a drive system that locks the front and rear pins by means of latches connected to each other, this connection being made by means of spring-actuated arms. This system has the disadvantage that the safety of the system resides only in the force of the said mechanical spring.

[0004] The patent EP2161378 discloses a coupler which is actuated by means of the hydraulic cylinders of the front and rear locks, but it has no mechanical locking in case of failure of one cylinder, e.g. if a cylinder breaks. The present invention differs from the said disclosure since it achieves the goal of mechanical locking by means of the front latch (6) and the locking plate (11).

TECHNICAL PROBLEMS TO BE SOLVED

[0005] It is an objective of this invention to provide an improved alternative safety mechanism, by providing the quick couplers of the excavating machines with a simple and effective safety system, thus presenting the advantage of eliminating human intervention on the coupler and eliminating the possibility of the quick coupler releasing the accessory after the safety system is activated, i.e., by activating the locking plate (11) the rear latch (7) is prevented from retracting. The rear latch (7) holds the rear pin (5) of the accessory (3) and prevents it from being released. The front latch (6) is then operated, thus locking the front pin (4) on the accessory (3). The rear latch (7) has a retaining element (13) which is welded to it, preventing the locking plate (11) from proceeding with its movement, latching it.

DESCRIPTION OF THE FIGURES

Indication of the reference numbers:

[0006]

- (1) coupler;
- (2) excavator;
- (3) accessory;

- (4) front pin;
- (5) rear pin;
- (6) front latch;
- (7) rear latch;
- (8) hydraulic drive cylinder;
- (9) hydraulic safety cylinder;
- (10) connecting bar;
- (11) locking plate;
- (12) warning device.

[0007] Figure 1 - cross-section view of the present invention where the following components and their spatial relationship can be observed: coupler (1); front pin (4); rear pin (5); front latch (6); rear latch (7); hydraulic drive cylinder (8); hydraulic safety cylinder (9) and connecting bar (10).

[0008] Figure 2 - rear view of the present invention.

[0009] Figure 3 - top view of the present invention.

[0010] Figure 4 - perspective view of the present invention, where the following components and their spatial relationship can be observed: coupler (1); front pin (4); rear pin (5); front latch (6); rear latch (7); hydraulic drive cylinder (8); hydraulic safety cylinder (9); connecting bar (10); locking plate (11) and warning device (12).

[0011] Figure 5 - cross-section view of the present invention and in the position where the pins (4) (5) of an accessory (3) are not locked by the front (6) and rear (7) latches respectively.

[0012] Figure 6 - cross-section view of the present invention and in the position where the pins (4) (5) of an accessory (3) are locked by the front (6) and rear (7) latches respectively.

[0013] Figure 7 - Representation of a machine (2) with the quick coupler (1) which is the object of this invention, and of an accessory (3) with front (4) and rear pins (5).

DETAILED DESCRIPTION OF THE INVENTION

[0014] This invention relates to a coupler (1) for accessories (3) of machines (2) such as, for example excavators, the said accessories comprising coupling pins. The coupler (1), for this purpose, has at least two hydraulic cylinders, one hydraulic drive cylinder (8) and one hydraulic safety cylinder (9). These cylinders are responsible for moving two latches (6)(7), one front safety latch (6) and one rear safety latch (7), which are connected by at least one connecting arm (10). One can say that the front (6) and rear (7) latches are the retention system of this invention.

[0015] The said connecting arm (10), in its turn, comprises two hinged bars, one of them having a right-angled geometry and which, at one end, the front one, is provided with means of articulation with the other hinged bar of the connecting arm (10) and, at the other end, the rear one, a locking plate (11).

[0016] The hydraulic cylinders (8) (9) are driven by a hydraulic non-return valve (not illustrated herein) that controls the inlet and the outlet, opening the oil outlet

when there is pressure at the inlet, and which, in case a tube of one of the cylinders bursts, causes it to not move back, since the hydraulic non-return valve keeps the oil inside the cylinders.

[0017] The hydraulic cylinders (8) (9), when actuated, move the connecting arm (10), which closes the latches (6) (7), locking the two pins (4) (5) of the accessory (3), respectively, with the said locking occurring simultaneously.

[0018] The hydraulic drive cylinder (8) starts its linear displacement and on an axis perpendicular to the one of the safety cylinder (9), and when doing so, it actuates both the front (6) and rear (7) latches. Simultaneously to this movement, the hydraulic safety cylinder (9) acts promoting the movement of the connecting arm (10) until the locking plate (11) is positioned where the front (5) and rear (6) latches are mechanically locked. This mechanical locking is achieved through a retaining element (13), welded to the rear lock (7), which prevents the locking plate (11) from continuing the movement, that is, it latches the locking plate (11). In this position, even if the cylinders (8) (9) are not actuated, the safety system does not allow the latches (6)(7) to be deactivated.

[0019] Thus, when positioning the quick coupler (1) on at least two pins (4) (5) of an accessory (3) of a machine (2), the rear latch (7) holds the rear pin (5) of the accessory (3) thus preventing it from being released. The front latch (6) is then actuated, locking the front pin (4) on the accessory.

[0020] The latches (6) (5) also serve as a visual alert to the machine operator, since it is possible to view the latches engaging in the pins (4) (5). However, in a preferred embodiment of the invention, it comprises a warning device (12), which is aimed at warning the operator about the status of the quick coupler (1). This warning device (12) is attached to the shaft that connects to the hydraulic cylinder (9) and is solidary with it, i.e., the shaft rotation movement causes the warning device (12) to move.

necting arm (10) until the locking plate (11) reaches the retaining element (13) by simultaneously locking the front (6) and rear (7) latches on the two front (4) and rear (5) pins of the accessory (3), respectively.

2. Coupler according to claim 1 wherein it further comprises a warning device (12) which is attached to the shaft connected to the hydraulic cylinder (9) and solidary with it.

Claims

1. Coupler (1) for accessories (3) of excavating machinery (2) comprising at least one hydraulic drive cylinder (8) and at least one hydraulic safety cylinder (9), said cylinders (8) (9) being responsible for moving at least two latches (6)(7), a front safety latch (6) and a rear safety latch (7), which are connected by at least one connecting arm (10) and the accessory (3) having two pins (4) (5), one front pin (4) and one rear pin (5), **characterized in that** the rear latch (7) has a retaining element (13); the connecting arm (10) has two hinged bars, one of which at its front end comprises means of articulation with the other hinged bar and, at its rear end, a locking plate (11); and **in that** the hydraulic cylinders (8)(9) are actuated by a hydraulic non-return valve, moving the con-

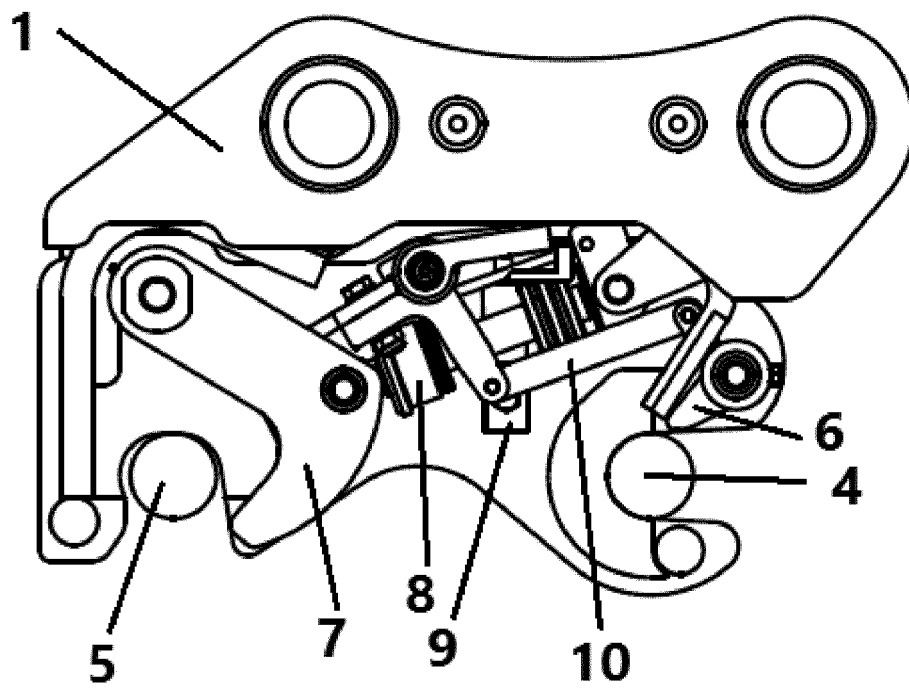


Figure 1

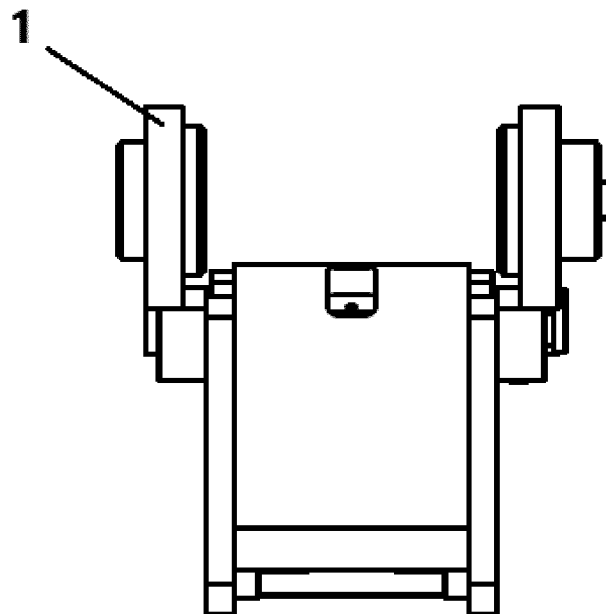


Figure 2

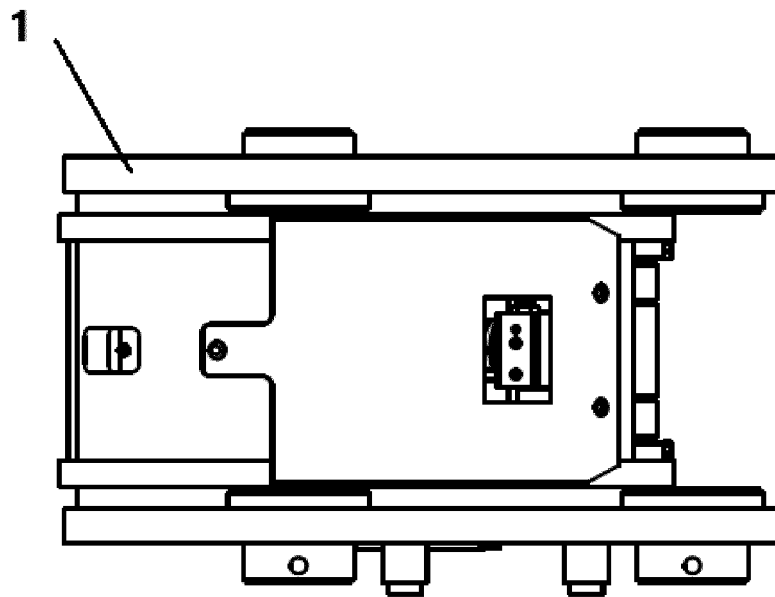


Figure 3

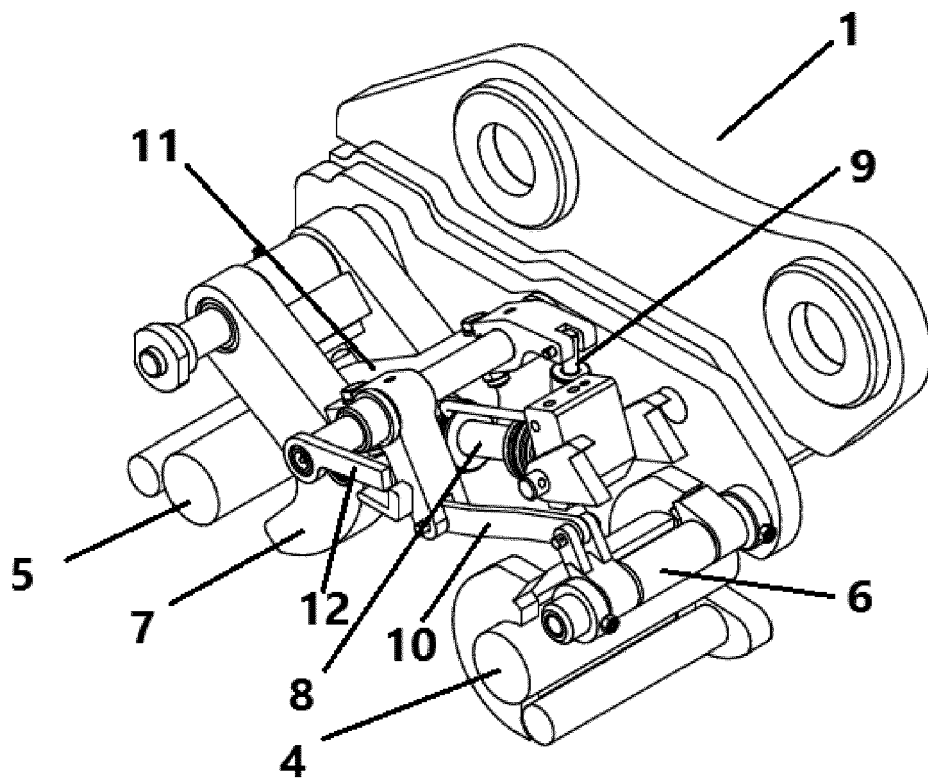


Figure 4

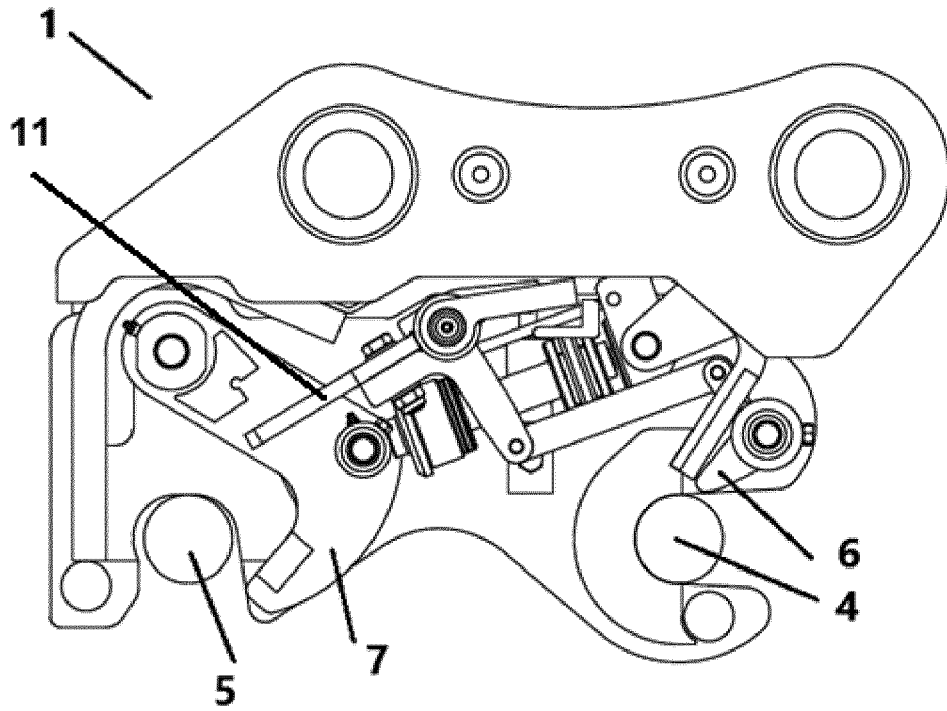


Figure 5

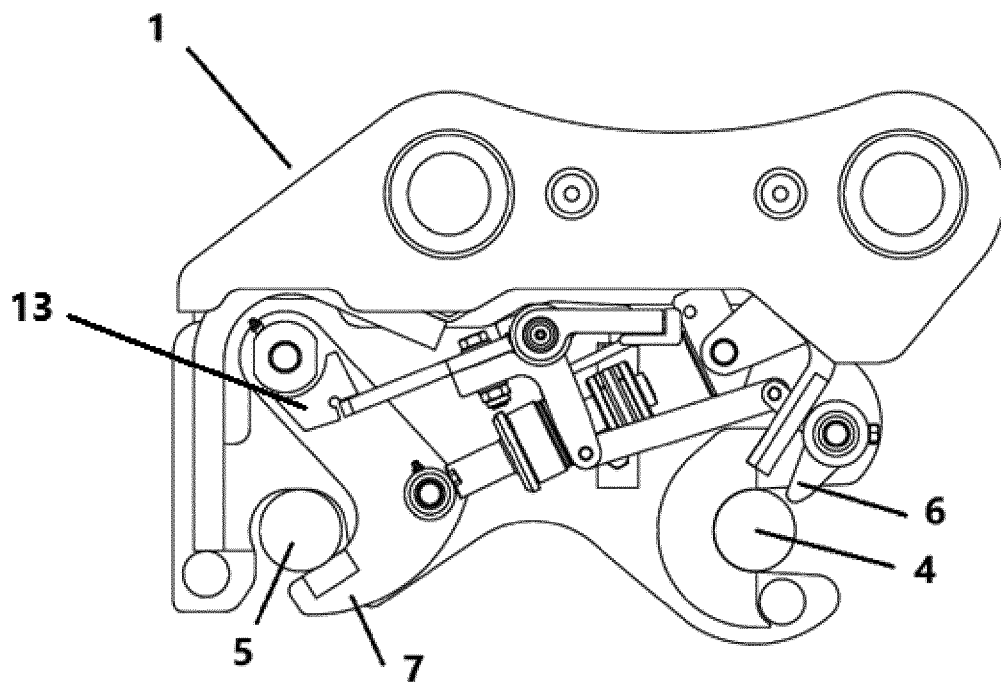


Figure 6

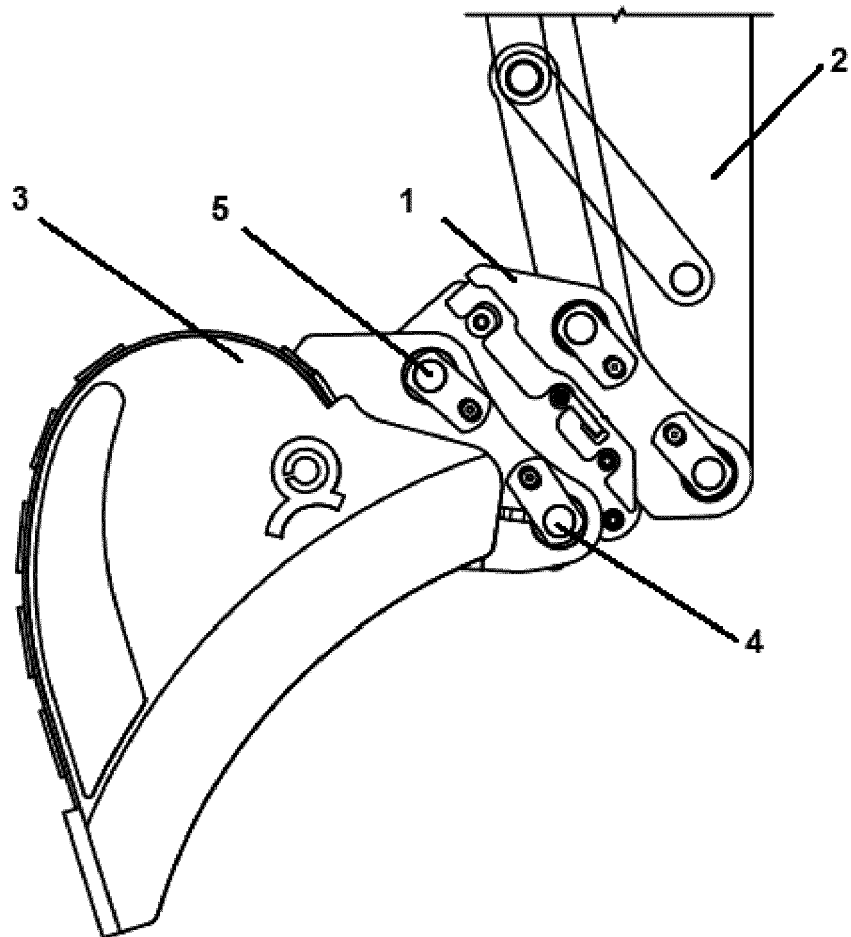


Figure 7



EUROPEAN SEARCH REPORT

Application Number
EP 20 39 8007

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DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
A	WO 2014/072709 A1 (MILLER INT LTD [GB]; MILLER GARY [GB]) 15 May 2014 (2014-05-15) * page 25; figures 3-4 *	1,2	INV. E02F3/36
A	EP 2 161 378 A1 (HILL IAN [GB]) 10 March 2010 (2010-03-10) * paragraph [0034]; figures 6-7 *	1,2	
A	WO 2011/033253 A1 (MILLER GARY [GB]) 24 March 2011 (2011-03-24) * figures 7-11 *	1,2	
			TECHNICAL FIELDS SEARCHED (IPC)
			E02F
The present search report has been drawn up for all claims			
Place of search The Hague		Date of completion of the search 30 September 2020	Examiner Rocabruna Vilardell
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			

**ANNEX TO THE EUROPEAN SEARCH REPORT
ON EUROPEAN PATENT APPLICATION NO.**

EP 20 39 8007

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The members are as contained in the European Patent Office EDP file on
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30-09-2020

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
WO 2014072709 A1	15-05-2014	GB 2509303 A	02-07-2014
		GB 2525328 A	21-10-2015
		WO 2014072709 A1	15-05-2014
EP 2161378 A1	10-03-2010	EP 2161378 A1	10-03-2010
		GB 2463158 A	10-03-2010
		GB 2473577 A	16-03-2011
		US 2010061799 A1	11-03-2010
WO 2011033253 A1	24-03-2011	CN 102753761 A	24-10-2012
		GB 2473630 A	23-03-2011
		GB 2473685 A	23-03-2011
		GB 2499144 A	07-08-2013
		GB 2500530 A	25-09-2013
		US 2012237327 A1	20-09-2012
		WO 2011033253 A1	24-03-2011

REFERENCES CITED IN THE DESCRIPTION

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Patent documents cited in the description

- KR 101777739 [0003]
- EP 2161378 A [0004]