PCT WORLD INTELLECTUAL PROPERTY ORGANIZATION
International Bureau

INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(51) International Patent Classification 4 :		(11) International Publication Number:
E02F 9/28, 3/40	A1	WO 88/ 05483
		(43) International Publication Date: 28 July 1988 (28.07.88)

(21) International Application Number: PCT/US87/03157

(22) International Filing Date: 30 November 1987 (30.11.87)

(31) Priority Application Numbers: 004,515
004,516

(32) Priority Dates: 20 January 1987 (20.01.87)
20 January 1987 (20.01.87)

(33) Priority Country: US

(71) Applicant: CATERPILLAR INC. [US/US]; 100 Northeast Adams Street, Peoria, IL 61629-6490 (US).

(72) Inventors: DIEKEVERS, Mark, Steven ; 205 McKinney Parkway, Washington, IL 61571 (US). FIDLER, Jerry, Dale ; 117 Melody Lane, East Peoria, IL 61611 (US). JENSEN, Brian, D. ; 402 S. French Drive, Dunlap, IL 61525 (US).

(74) Agents: BURROWS, J., W. et al.; Caterpillar Inc., 100 Northeast Adams Street, Peoria, IL 61629-6490 (US).

(81) Designated States: AU, DE (European patent), FR (European patent), GB (European patent), JP, SE (European patent).

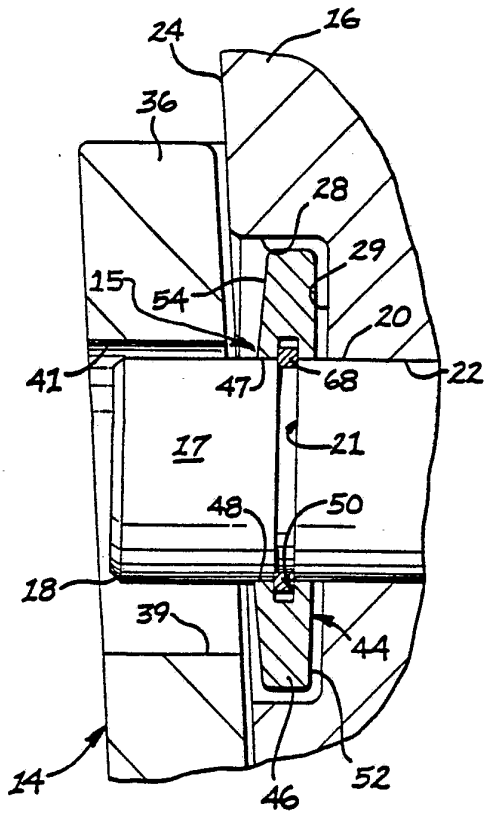
Published
With international search report.
With amended claims.

Date of publication of the amended claims:
7 September 1988 (07.09.88)

(54) Title: POSITIVE KEEPER MEANS FOR PINS OF EARTHWORKING TIPS

(57) Abstract

Pin retainer assembly having a keeper means for retaining earthworking tips on adapters. Positive retention of earthworking tips on their adapters by their retaining pins during its work cycle is extremely important from an operational as well as a cost standpoint. The loss of the tips materially affect productions in addition to the time consuming expense of replacement of repair of the components. Not only must the tips be adequately retained, they must be capable of quick removal for replacement purposes. Keeper means (44) for the pin (17) is captured in a recess (28) between a nose (16) of the adapter (12) and a sidewall (36) of the tips (14) and includes a washer (46) slidably disposed on the pin (17) and a resilient retaining ring (68, 78) having a predetermined radial thickness disposed in locking engagement in a groove (21) on the pin (17) and a groove (50) of the washer (46). One of the grooves (21, 50) in the pin (17) and the washer has a depth equal to or greater than the predetermined radial thickness of the retaining ring (68, 78) and the other one of the grooves (21, 50) has a depth sufficient to prevent camming of the ring (68, 78) out of the groove (21, 50) and to provide substantially the maximum cross-section width of the ring (68, 78) in shear. In order to disassemble the pin (18), the ring (68, 78) must be sheared or the washer (46) fractured.



FOR THE PURPOSES OF INFORMATION ONLY

Codes used to identify States party to the PCT on the front pages of pamphlets publishing international applications under the PCT.

AT	Austria	**FR**	France	**ML**	Mali
AU	Australia	**GA**	Gabon	**MR**	Mauritania
BB	Barbados	**GB**	United Kingdom	**MW**	Malawi
BE	Belgium	**HU**	Hungary	**NL**	Netherlands
BG	Bulgaria	**IT**	Italy	**NO**	Norway
BJ	Benin	**JP**	Japan	**RO**	Romania
BR	Brazil	**KP**	Democratic People's Republic of Korea	**SD**	Sudan
CF	Central African Republic			**SE**	Sweden
CG	Congo	**KR**	Republic of Korea	**SN**	Senegal
CH	Switzerland	**LI**	Liechtenstein	**SU**	Soviet Union
CM	Cameroon	**LK**	Sri Lanka	**TD**	Chad
DE	Germany, Federal Republic of	**LU**	Luxembourg	**TG**	Togo
DK	Denmark	**MC**	Monaco	**US**	United States of America
FI	Finland	**MG**	Madagascar		

AMENDED CLAIMS

[received by the International Bureau on 10 August 1988 (10.08.88);
original claims 1-15 cancelled; new claims 16-30 added (5 pages)]

16. (New) A retaining pin (17) and a keeper means (44) adapted for use in an earthworking device (10) having a nose (16) and a tip (14) telescopically mounted on the nose (16), the nose (16) has a transverse bore (22) and laterally converging sidewalls (24,26), and the tip (14) defines a mating socket (30) with laterally spaced apart converging sidewalls (36,38) defining a pair of aligned holes (39,40) therein axially aligned with the bore (22), and a recess (28) defined in one of the nose (16) and the tip (14) in axial alignment with the bore (22) and the holes (39,40), the retaining pin (17) and the keeper means (44) comprising;

the retaining pin (17) having an outer peripheral surface (20) with an annular groove (21) defined in the outer peripheral surface (20); and

the keeper means (44) having a metallic washer (46) and a resilient retaining ring (68,78), the washer (46) has a frusto-conical side surface (54) and an inner peripheral surface (47) with an annular groove (50) defined in the peripheral surface (47), the keeper means (44) when assembled is disposed in the recess (28) and the pin (17) is disposed in the aligned bore (22) and holes (39,40) to retain the tip (14) on the nose (16), the washer (46) being slidably disposed on the pin (17), and the ring (68,78) has a cross section with a predetermined radial thickness and is disposed in locking engagement within the groove (21) on the pin (17) and the groove (50) in the washer (46), the ring (68,78), in use, is operative in conjunction with the grooves (21,50) in the pin (17) and the washer (46) to prohibit disassembly of the pin (17) from the washer (46) without an external force being applied to the pin (17) sufficient to shear the ring (68,78) or to fracture the washer (46) with one

of the sides (54,52) of the washer (46) adapted for cooperation with one of the lateral side walls (24,26,36,38) of the nose (16) and the tip (14) to effectively concentrate the external force close to the interface of the grooves (21,50).

17. (New) The retaining pin (17) and the keeper means (44) of claim 16 wherein said cross-section of the retaining ring (68) is generally rectangular in cross-section.

18. (New) The retaining pin (17) and the keeper means (44) of claim 16 wherein one of the grooves (21,50) in the pin (17) and washer (46) has a depth equal to or greater than the predetermined radial thickness of the retaining ring (68,78).

19. (New) The retaining pin (17) and the keeper means (44) of claim 18 wherein the other one of the grooves (21,50) has a depth equal to one half of the predetermined radial thickness of the retaining ring (68,78).

20. (New) The retaining pin (17) and the keeper means (44) of claim 19 wherein said retaining ring (68,78) has a circular cross section.

21. (New) The retaining pin (17) and the keeper means (44) of claim 16 wherein the depth of the groove (21) in the pin (17) is generally equal to one half of the predetermined radial thickness of the retaining ring (68,78) and the groove (50) in the washer (46) has a depth equal to or greater than the predetermined radial thickness of the retaining ring (68,78).

22. (New) The retaining pin (17) and the keeper means (44) of claim 16 wherein the resilient retaining ring (68,78) is split and circular.

23. (New) An earthworking device (10) comprising:

an adapter (12) having a nose (16) with forwardly converging lateral sidewalls (24,26) and defining a transverse bore (22) and;

an earthworking tip (14) telescopically mounted on the nose (16) of the adapter (12) and having a pair of spaced apart forwardly converging lateral sidewalls (36,38) and a pair of laterally aligned holes (39,40) defined in the sidewalls (36,38), the bore (22) and the holes (39,40) being substantially axially aligned, a recess (28) formed in one of the nose (16) and the earthworking tip (14) and in substantial axial alignment with the bore (22) and the holes (39,40);

a cylindrical pin (17) having a groove (21) and during assembly being slidably disposed in the bore (22) and the holes (39,40) for retaining the tip (14) on the adapter (12); and

a keeper means (44) for securing the pin (17) in the bore (22) being located in the recess (28) for abutting contact with the nose (16) and one of the sidewalls (24,26,36,38), the keeper means (44) including a metallic washer (46) and a split resilient retaining ring (68,78), the metallic washer (46) having a frusto-conical side surface (54) disposed adjacent one of the pair of spaced apart forwardly converging lateral sidewalls (36,38) of the earthworking tip (14) or one of the forwardly converging lateral sidewalls (24,26) of the nose (16) and an inside surface (47) defining a bore (48) and a groove (50) opening into the bore (48), the bore (48)

of the metallic washer (46) being axially alignable with the bore (22) in the nose (16), the resilient retaining ring (68,78) having a cross-section of a predetermined radial thickness captured in one of the grooves (21,50) in the pin (17) and the washer (46) and adapted during assembly to permit slidable insertion of the pin (17) in the bore (22) and the holes (39,40) for locking engagement of the retaining ring (68,78) with the other of the grooves (21,50), the depth and configuration of the grooves (21,50) being sufficient to prevent camming of the ring (68,78) out of the grooves (21,50), and the retaining ring (68,78) and washer (46) being a configuration sufficient to prohibit disassembly of the pin (17) without an external force being applied to the pin (17) sufficient to shear the retaining ring (68,78) or to fracture the washer (46) with each of the sides (52,54) of the washer (46) constructed to effectively concentrate the force close to the interface of the grooves (21,50).

24. (New) The earthworking device (10) of claim 23 wherein the retaining ring (68) has a rectangular cross-section.

25. (New) The earthworking device (10) of claim 24 wherein the groove (50) in the washer (46) has a pair of parallel sidewalls (56,58), the groove (21) of the pin (17) has a pair of parallel sidewalls (62,64) and the retaining ring (68,78) has a pair of parallel sidewalls (70,72) in engagement with the pair of sidewalls of the groove (21) in the pin (17) and the groove (50) in the washer (46).

26. (New) The earthworking device (10) of claim 23 wherein the depth of the groove (21) in the

pin (17) is generally equal to one half of the predetermined radial thickness of the retaining ring (68,78) and the groove (50) in the washer (46) has a depth equal to or greater than the predetermined radial thickness of the retaining ring (68,78).

27. (New) The earthworking device (10) of claim 23 wherein the recess (28) is formed in the nose (16).

28. (New) The earthworking device (10) of claim 23 wherein one of the grooves (21,50) in the pin (17) and washer (46) has a depth equal to or greater than the predetermined radial thickness of the retaining ring (68,78).

29. (New) The earthworking device (10) of claim 28 wherein the other one of the grooves (21,50) has a depth generally equal to one half of the predetermined radial thickness of the retaining ring (68,78).

30. (New) The earthworking device (10) of claim 29 wherein the retaining ring (68,78) has a circular cross-section.