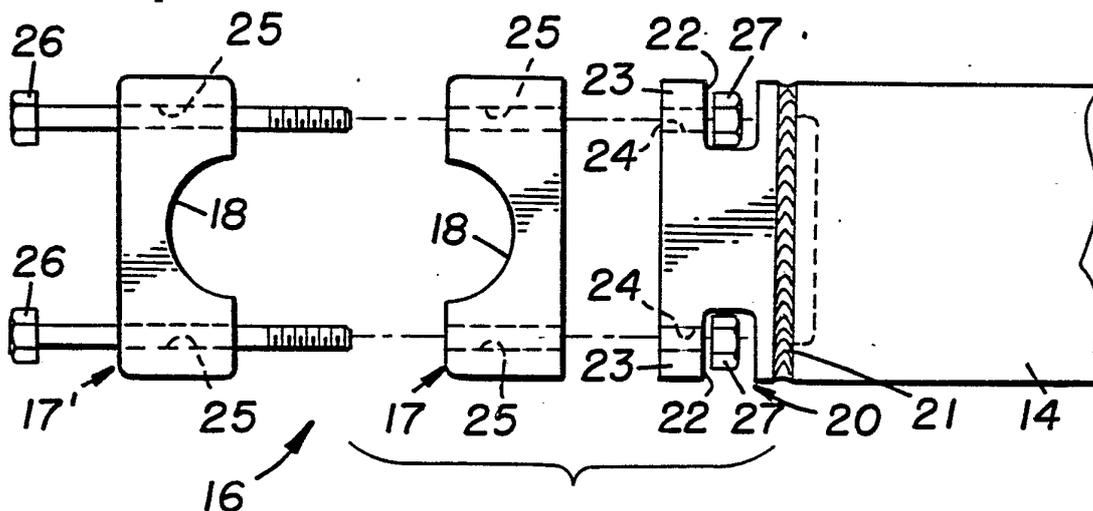




INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

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<p>(21) International Application Number: PCT/US79/00763 (22) International Filing Date: 24 September 1979 (24.09.79) (71) Applicant (for all designated States except US): CATERPILLAR TRACTOR CO. [US/US]; 100 Northeast Adams Street, Peoria, IL 61629 (US). (72) Inventors; and (75) Inventors/Applicants (for US only): NOBLE, Charles, M. [US/US]; 902 Valencia Drive, Shorewood, IL 60436 (US). OLTHOFF, James, A. [US/US]; 17308 South Park, South Holland, IL 60473 (US).</p>		<p>(74) Agents: WALTERS, Ralph, E.; 100 Northeast Adams Street, Peoria, IL 61629 (US) et al. (81) Designated States: BR, GB, JP, US. Published <i>With international search report</i> <i>With amended claims</i></p>

(54) Title: REPLACEABLE BEARING ASSEMBLY FOR CONSTRUCTION VEHICLES



(57) Abstract

To push arms of a conventional bulldozer assembly are mounted on a track roller frame of a track-type tractor by bearing assemblies, each including a pair of bearing caps. One of the bearing caps is welded to the push arm, thus requiring that it be cut-off upon replacement thereof. In addition, the bearing cap welded to the push arm must be selectively hardened to avoid stress cracking in the heat affected zone of the weld. This invention overcomes the above problems by providing a bearing assembly (16) which includes a pair of separable first and second bearing caps (17, 17') which are secured together and to the push arm by common fasteners (28).

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DescriptionReplaceable Bearing Assembly For Construction VehiclesTechnical Field

This invention relates to a multi-part
5 bearing assembly for pivotally mounting a work member
on a vehicle.

Background Art

The bearing assemblies, pivotally mounting work
members on a construction vehicle, are oftentimes
10 subjected to loads of high magnitude. Such bearing
assemblies thus require periodic replacement or re-
pair. Replacement or repair of conventional bearing
assemblies requires prolonged "downtime" of the
construction vehicle and involves considerable
15 expense.

For example, the push arms or C-frame of a
bulldozer assembly are pivotally mounted on track
roller frames of a track-type tractor by a pair of
bearing assemblies that require periodic replacement
20 or repair due to the heavy thrust loads imposed
thereon during operation of the bulldozer assembly.
As shown in FIG. 3 of the drawings, it is common
practice to weld a first bearing cap 33 of each
bearing assembly to a respective push arm 32 and a
25 second bearing cap 34 is releasably secured to the
first bearing cap to mount the push arm on a ball
stud secured on a track roller frame. Replacement
of the first bearing cap, which is welded to the
push arm, requires that it be cut-off the push arm
30 and a replacement part welded in its stead. This
procedure is obviously time consuming and costly.



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Another problem arising in respect to the welding of the above first bearing cap to the push arm is that the internal spherical bearing surface of the cap must be selectively hardened (e.g., Rockwell C70) since it is subjected to the greatest amount of thrust loads imposed on the push arm while the welding area must be composed of a material having low hardenability to avoid cracking in the heat affected zone. The other bearing cap does not normally require such selective hardening. This selective hardening procedure is also time consuming and adds to the overall cost of the bearing assembly. Furthermore, the two bearing caps must be identified by separate part numbers.

15 Disclosure of Invention

The present invention is directed to overcoming one or more of the problems as set forth above.

In one aspect of this invention, a first member is pivotally mounted on a second member by a bearing assembly which includes first and second separable bearing caps. Fastening means are provided for releasably securing the first bearing cap to the first member and for further releasably securing the caps together.

In another aspect of this invention the bearing assembly is utilized to pivotally mount a work member on a construction vehicle, e.g., to pivotally mount a push arm or C-frame of a bulldozer assembly on a track roller frame of a track-type tractor, or on the frame of a wheel-type tractor.

The bearing assembly thus avoids the need for welding the first cap to the push arm, for example,



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which is common practice in the art today. In addition to avoiding the necessity of having to cut-off the first cap for repair or replacement purposes, the first cap does not require selective hardening.

5 Furthermore, the bearing assembly of this invention facilitates the use of the same part number for the first and second caps since they may have identical constructions.

Brief Description of Drawings

10 FIG. 1 is a side elevational view of a track-type tractor having a bulldozer assembly pivotally mounted thereon by a pair of bearing assembly embodiments of the present invention;

FIG. 2 is an enlarged and exploded side
15 elevational view of one of the bearing assemblies and a portion of a push arm of the bulldozer assembly;

FIG. 3 is a view similar to FIG. 2, but illustrates a prior art bearing assembly;

FIG. 4 is an enlarged, top plan view, taken
20 in the direction of arrows IV-IV in FIG. 1, showing the bearing assembly in its assembled condition for pivotally mounting the push arm of the bulldozer assembly on a track roller frame of the tractor;

FIG. 5 is a side elevational view of the bearing
25 assembly; and

FIG. 6 is a backside, isometric view of the bulldozer assembly, showing application of a pair of bearing assemblies of this invention to a tag link pivotally interconnected between a main frame of the
30 tractor and a blade of the bulldozer assembly.



Best Mode of Carrying Out The Invention

FIG. 1 illustrates a track-type tractor 10 having a bulldozer assembly 11 mounted forwardly thereon. Bulldozer assembly 11 comprises a generally upright blade 12 connected to a pair of laterally spaced track roller frames 13 (one shown) of tractor 10 by a pair of laterally spaced first members or push arms 14 (one shown). The forward end of each push arm 14 is pivotally connected to blade 12 at a pivot connection 15 whereas a rearward end of the push arm is pivotally connected to a respective track roller frame 13 by a bearing assembly 16, embodying the invention herein. The push arms can also be connected to the frame of a wheel-type tractor.

Referring to FIGS. 2, 4, and 5, bearing assembly 16 comprises a pair of separable first and second caps 17 and 17', respectively, which are identical in construction. Thus, the bearing caps can be identified by the same part number and can be subjected to the same manufacturing processes, such as case hardening. Each bearing cap 17 and 17' has a semi-spherical bearing surface 18 defined therein whereby upon mounting of the bearing caps on a second member or ball stud 19 (FIG. 4), push arm 14 is adapted to pivot on track roller frame 13.

As shown in FIG. 2, a connector 20 is secured, such as by welds 21, to a rearward end of push arm 14. Connector 20 has a pair of slots 22 formed transversely therethrough and disposed on upper and lower sides of the connector. A pair of upper and lower flanges 23 are thus defined on connector 20 with each flange having a bore 24 formed therethrough. Upon assembly, bores 24 will align with respective bores 25 formed through bearing caps 17 and 17' to

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receive a pair of bolts 26 therethrough. As shown in FIGS. 4 and 5, an end portion of each bolt 26 is threadably attached to a nut 27, disposed in a respective slot 22, to thus provide fastening means 28 for releasably securing bearing cap 17 to connector 20 which forms part of push arm 14 and to further releasably secure bearing caps 17 and 17' together.

FIG. 3 illustrates a conventional bearing assembly 29 comprising a connector 30 welded at 31 between a rearward end of a push arm 32 and the backside of a first bearing cap 33. A second bearing cap 34 is releasably secured to bearing cap 33 and connector 30 by a pair of bolts 35. As discussed above, replacement of bearing cap 33, which is subjected to heavier thrust loads than bearing cap 34, requires a cutting-off and replacement by another welded-on bearing cap. Furthermore, bearing cap 33 must be selectively case hardened to avoid stress cracking in the heat affected zone of weld 31, securing the bearing cap to connector 30.

Contrast the drawbacks of conventional bearing assembly 29 with bearing assembly 16 of this invention which is adapted to be assembled and disassembled expeditiously and which may be comprised of identical bearing caps 17 and 17' which are processed and constructed in the same manner and thus can be identified by the same part number.

Industrial Applicability

FIG. 1 illustrates a principle use for the bearing assembly 16 of this invention; namely, for pivotally mounting push arm 14 of bulldozer assembly 11 on track roller frame 13 of track-type tractor 10. However, it should be understood that bearing



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assembly 16 will find many other applications in construction vehicles or the like wherein a pair of members are pivotally mounted together and heavy thrust loads are imposed on at least one of the members. For example, referring to FIG. 6, bearing assemblies 16 may be utilized for pivotally interconnecting a tag link 37 between a main frame 38 of tractor 10 and blade 12. Tag link 37 essentially functions to transmit side loads imposed on blade 12 to main frame 38 directly to thus eliminate the need for standard diagonal bracing.

Upon assembly of bearing assembly 16, each push arm 14 would be suitably propped-up, adjacent to a respective ball stud 19, with bearing caps 17 and 17' mounted on the ball stud as shown in FIGS. 4 and 5. Insertion of bolts 26 through aligned bores 24 and 25 will thus facilitate securance of nuts 27 on the bolts whereby the bearing assembly is structurally integrated to permit push arm 14 to pivot relative to track roller frame 13. It should be noted that this nested position of nuts 27, within slots 22, substantially protect them against damage.

Furthermore, as shown in FIG. 5, a width W of each slot 22 is less than the combined width W_1 of nut 27 and a length W_2 defining an end portion of bolt 26 which extends into a respective slot 22. Thus, nuts 27 will be held captive within slots 22 and not subjected to potential dislodgement from bolts 26 during operation of the tractor. The above method of assembly would be reversed should the need arise to replace one or both bearing caps 17 and 17' with new ones.

Also, essentially the same assembly method would be employed for pivotally interconnecting tag link



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37 of FIG. 6 between main frame 38 of tractor 10 and blade 12. It should be understood that tag link 37 may be either connected to blade 12 or push arm 14.



Claims

1. In a vehicle having a first member (14), a second member (19), and bearing means (16) for pivotally mounting said first member (14) on said second
5 member (19) and for counteracting thrust loads imposed on said first member (14), the improvements comprising said bearing means (16) including separable first (17) and second (17') bearing caps, and fasten-
10 ing means (28) for releasably securing said first bearing cap (17) to said first member (14) and for further releasably securing said first (17) and second (17') bearing caps together.

2. The vehicle of claim 1 wherein each of said first (17) and second (17') bearing caps are at
15 least substantially identical in construction.

3. The vehicle of claim 1 wherein said first member (14) has a connector (20) secured thereon, said first bearing cap (17) being secured directly to said connector (20).

20 4. The vehicle of claim 3 wherein said connector (20) has a pair of upper and lower slots (22) defined transversely therethrough and wherein said fastening means (28) includes at least two bolts (26) extending sequentially through said second bearing
25 cap (17'), said first bearing cap (17), and said connector (20) and into said slots (22).

5. The vehicle of claim 4 wherein said fasten-
ing means (28) further includes a nut (27) disposed within each of said slots (22) and threadably attached
30 to a respective one of said bolts (26).



6. The vehicle of claim 5 wherein the width (W) of each of said slots (22) is less than the combined width (W_1) of each said nut (27) and the length (W_2) of the end portion of each said bolt (26) extending
5 into each said slot.

7. The vehicle of claim 1 wherein said second member (19) includes a ball stud (19) and wherein said first (17) and second bearing caps (17') each defines a semi-spherical bearing surface (18)
10 therein pivotally mounted on said ball stud (19).

8. The combination comprising
a first member (14),
a second member (19),
a bearing assembly (16) including
15 a pair of separable first (17) and second
(17') bearing caps pivotally mounted on said second member (19), and
common fastening means (28) for releasably
20 securing said first bearing cap (17) to said first member (14) and for further securing said first (17) and second (17') bearing caps together.

9. The combination of claim 8 wherein each of said first (17) and second (17') bearing caps are at least substantially identical in construction.

25 10. A tractor (10) having first and second frame portions (13),
a bulldozer assembly (11),
bearing means (16) for pivotally mounting
said bulldozer assembly (11) each on each one of
30 said first and second frame portions (13), said bearing means (16) including first (17) and second



(17') bearing caps, and

fastening means (28) for releasably securing said first bearing cap (17) to said bulldozer assembly (11) and for further releasably securing
5 said first (17) and second (17') bearing caps together.

11. The tractor (10) of claim 10 wherein each of said first (17) and second (17') bearing caps are at least substantially identical.

10 12. The tractor (10) of claim 10 further including a ball stud (19) secured on a side of each of said frame portions (13) and wherein a pair of said first (17) and second (17') bearing caps are pivotally mounted on said ball stud (19).



AMENDED CLAIMS

(received by the International Bureau on 9 April 1980 (09.04.80))

1. (Amended) In a vehicle having a first member (14), a second member (19), and bearing means (16) for pivotally mounting said first member (14)
5 on said second member (19) and for counteracting thrust loads imposed on said first member (14), said bearing means (16) including separable first (17) and second (17') bearing caps, and fastening means (28) for releasably securing said first bearing cap (17)
10 to said first member (14) and for further releasably securing said first (17) and second (17') bearing caps together, the improvement comprising:

upper and lower slots (22) defined transversely through said first member (14) and wherein
15 said fastening means (28) includes at least two bolts (26) extending sequentially through said second bearing cap (17'), said first bearing cap (17), and said connector (20) and into said slots (22).

2. The vehicle of claim 1 wherein each of
20 said first (17) and second (17') bearing caps are at least substantially identical in construction.

3. The vehicle of claim 1 wherein said first member (14) has a connector (20) secured thereon, said first bearing cap (17) being secured directly
25 to said connector (20).

4. (Cancelled)

5. (Amended) The vehicle of claim 1 wherein said fastening means (28) further includes a nut (27) disposed within each of said slots (22) and
30 threadably attached to a respective one of said bolts (26).



6. The vehicle of claim 5 wherein the width (W) of each of said slots (22) is less than the combined width (W_1) of each said nut (27) and the length (W_2) of the end portion of each said bolt (26) extending into each said slot.

7. The vehicle of claim 1 wherein said second member (19) includes a ball stud (19) and wherein said first (17) and second bearing caps (17') each defines a semi-spherical bearing surface (18) therein pivotally mounted on said ball stud (19).

8. (Amended) The combination comprising a first member (14) having upper and lower slots (22) defined transversely therethrough,
a second member (19),
a bearing assembly (16) including
a pair of separable first (17) and second (17') bearing caps pivotally mounted on said second member (19),
common fastening means (28) for releasably securing said first bearing cap (17) to said first member (14) and for further securing said first (17) and second (17') bearing caps together including
at least two bolts (26) extending through said first (17) and second (17') bearing caps and into said first member (14) and each bolt (26) being threadably attached to a nut (27) disposed within a respective one of said slots (22).

9. The combination of claim 8 wherein each of said first (17) and second (17') bearing caps are at least substantially identical in construction.



10. (Amended) A tractor (10) having a frame (13),

a bulldozer assembly (11) having a pair of laterally spaced push arms (14) and upper and lower slots (22) defined transversely through a rearward end of each push arm (14),

bearing means (16) for pivotally mounting each push arm (14) of said bulldozer assembly (11) on said frame (13), said bearing means (16) including first (17) and second (17') bearing caps, and

fastening means (28) for releasably securing said first bearing cap (17) to a respective push arm (14) of said bulldozer assembly (11) and for further releasably securing said first (17) and second (17') bearing caps together, said fastening means including a nut (27) disposed within each of said slots (22) and a bolt (26) extending through said first (17) and second (17') bearing caps and threadably attached to said nut (27).

11. The tractor (10) of claim 10 wherein each of said first (17) and second (17') bearing caps are at least substantially identical.

12. (Amended) The tractor (10) of claim 10 further including a ball stud (19) secured on said frame (13) and wherein a pair of said first (17) and second (17') bearing caps are pivotally mounted on said ball stud (19).



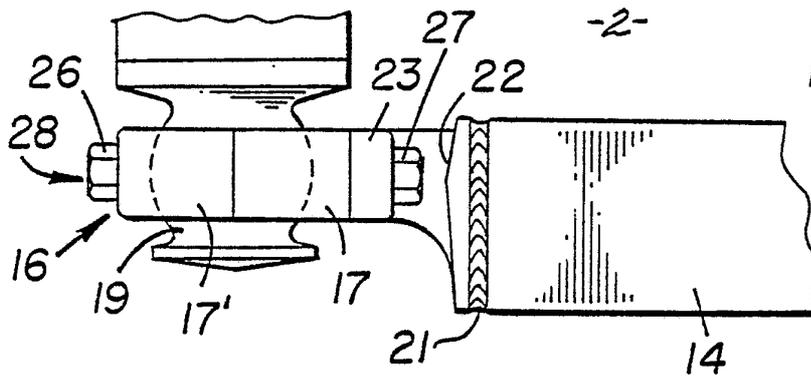


FIGURE 4

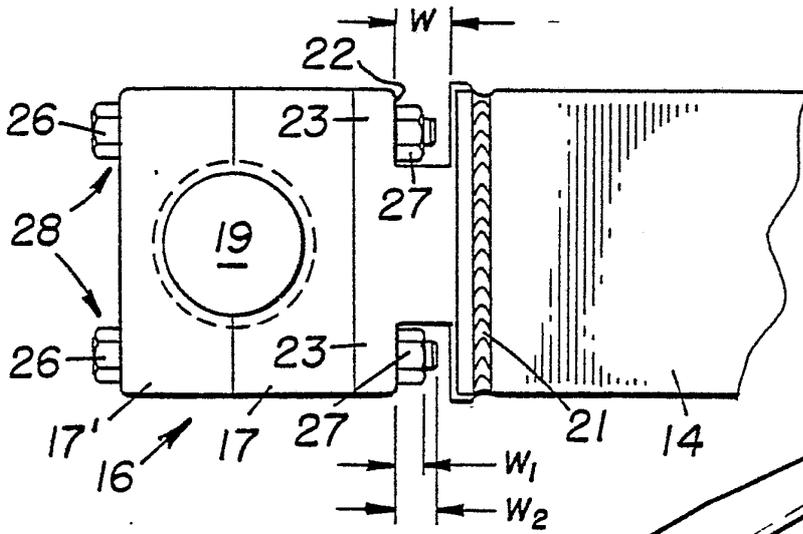


FIGURE 5

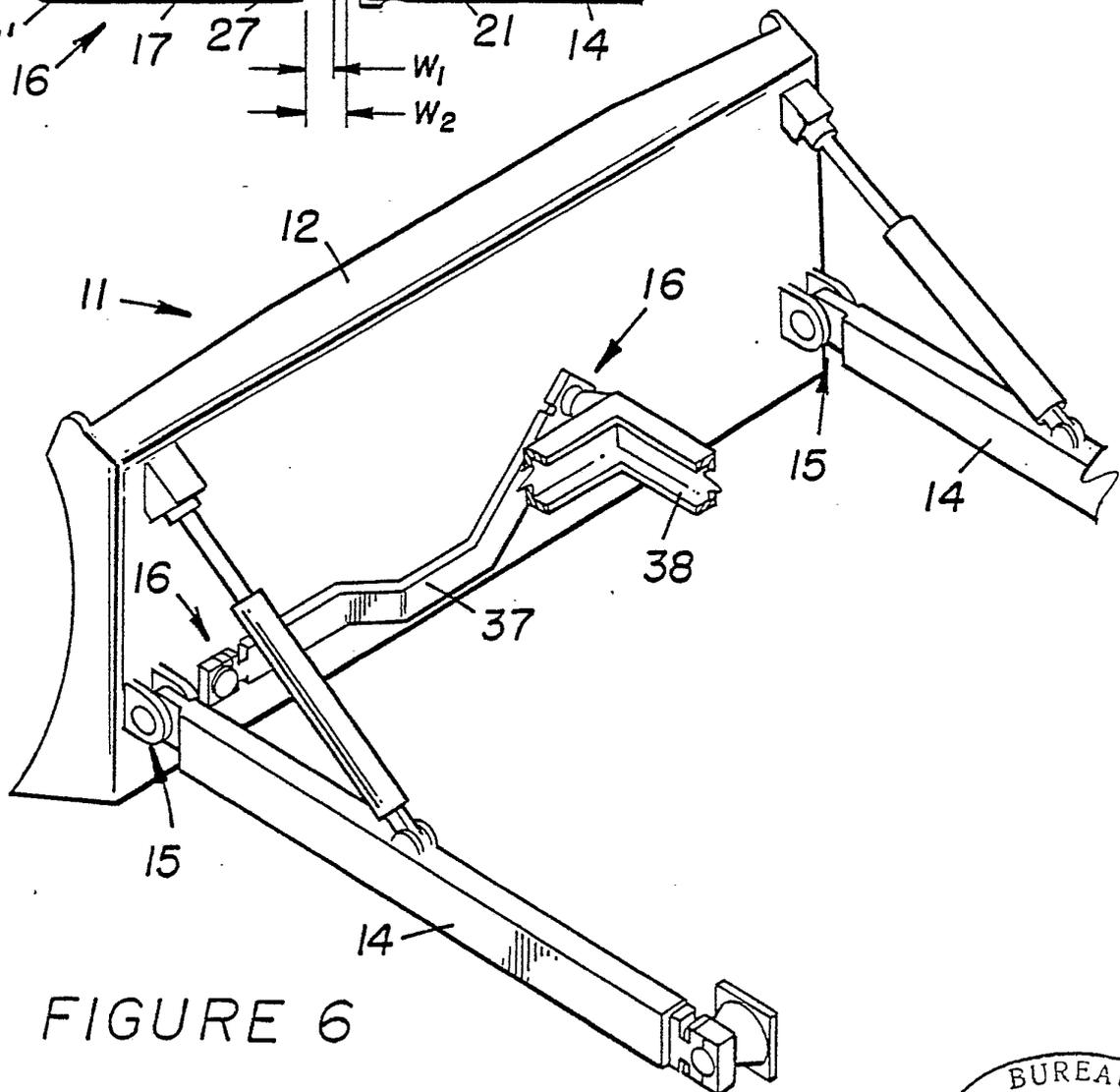


FIGURE 6

INTERNATIONAL SEARCH REPORT

International Application No PCT/US79/00763

I. CLASSIFICATION OF SUBJECT MATTER (if several classification symbols apply, indicate all) ³				
According to International Patent Classification (IPC) or to both National Classification and IPC INT. CL. F16C 11/06, 23/04; E02F 3/76 US. CL. 308/72; 172/801				
II. FIELDS SEARCHED				
Minimum Documentation Searched ⁴				
Classification System	Classification Symbols			
U.S.	308/2R, 15, 22, 72, 74, Dig. 2; 172/801, 803, 804, 806, 807, 809 403/76, 77, 141, 143; 280/400, 481			
Documentation Searched other than Minimum Documentation to the extent that such Documents are Included in the Fields Searched ⁵				
III. DOCUMENTS CONSIDERED TO BE RELEVANT ¹⁴				
Category *	Citation of Document, ¹⁶ with indication, where appropriate, of the relevant passages ¹⁷	Relevant to Claim No. ¹⁸		
A	US, A, 1,113,209, Published 13 october 1914, Flaherty et al	1-12		
A	US, A, 2,808,666, Published 8 October 1957, Schneckloth	1-12		
A	US, A, 2,995,953, Published 15 August 1961, De Fazi	1-12		
A	US, A, 3,208,805, Published 28 September 1965, Mayer	1-12		
A	US, A, 3,597,025, Published 3 August 1971, Ringel	1-12		
X	US, A, 3,684,324, Published 15 August 1972, Sterner	1-12		
X	US, A, 3,964,803, Published 22 June 1976, Eftefield et al	1-12		
A	US, A, 3,974,882, Published 17 August 1976, Eftefield	1-12		
<p>* Special categories of cited documents: ¹⁵</p> <table style="width: 100%; border: none;"> <tr> <td style="width: 50%; border: none;"> <p>"A" document defining the general state of the art</p> <p>"E" earlier document but published on or after the international filing date</p> <p>"L" document cited for special reason other than those referred to in the other categories</p> <p>"O" document referring to an oral disclosure, use, exhibition or other means</p> </td> <td style="width: 50%; border: none;"> <p>"P" document published prior to the international filing date but on or after the priority date claimed</p> <p>"T" later document published on or after the international filing date or priority date and not in conflict with the application, but cited to understand the principle or theory underlying the invention</p> <p>"X" document of particular relevance</p> </td> </tr> </table>			<p>"A" document defining the general state of the art</p> <p>"E" earlier document but published on or after the international filing date</p> <p>"L" document cited for special reason other than those referred to in the other categories</p> <p>"O" document referring to an oral disclosure, use, exhibition or other means</p>	<p>"P" document published prior to the international filing date but on or after the priority date claimed</p> <p>"T" later document published on or after the international filing date or priority date and not in conflict with the application, but cited to understand the principle or theory underlying the invention</p> <p>"X" document of particular relevance</p>
<p>"A" document defining the general state of the art</p> <p>"E" earlier document but published on or after the international filing date</p> <p>"L" document cited for special reason other than those referred to in the other categories</p> <p>"O" document referring to an oral disclosure, use, exhibition or other means</p>	<p>"P" document published prior to the international filing date but on or after the priority date claimed</p> <p>"T" later document published on or after the international filing date or priority date and not in conflict with the application, but cited to understand the principle or theory underlying the invention</p> <p>"X" document of particular relevance</p>			
IV. CERTIFICATION				
Date of the Actual Completion of the International Search ²	Date of Mailing of this International Search Report ²			
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International Searching Authority ¹	Signature of Authorized Officer ²⁰			
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