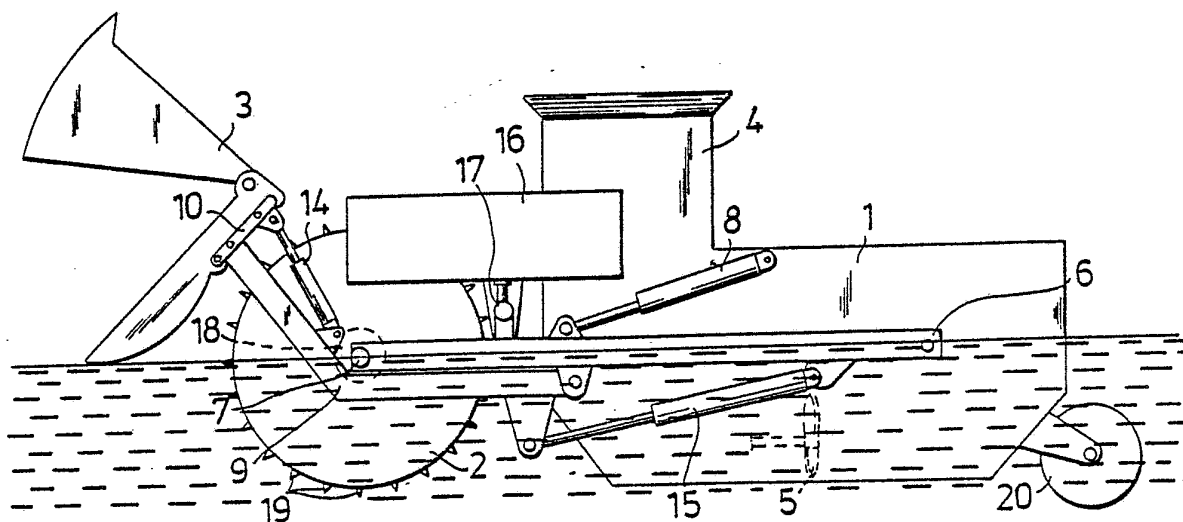




INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(51) International Patent Classification ³ : E02F 5/00	A1	(11) International Publication Number: WO 84/ 04938 (43) International Publication Date: 20 December 1984 (20.12.84)
(21) International Application Number: PCT/SE83/00236 (22) International Filing Date: 8 June 1983 (08.06.83) (71)(72) Applicant and Inventor: SONERUD, John, Teodor [SE/SE]; Vintervägen 30, S-824 00 Hudiksvall (SE). (74) Agents: FORSHEDEN, Jarl et al.; L.A. Groth & Co. AB, Västmannagatan 43, S-113 25 Stockholm (SE). (81) Designated States: AU, BE (European patent), BR, DE, DK, FI, FR (European patent), GB, JP, NL, NO, SU, US. Published With international search report. In English translation (filed in Swedish).		

(54) Title: APPARATUS AND METHOD FOR PERFORMING WORK AT SEA



(57) Abstract

An apparatus intended for work at sea includes a boat part (1), a pontoon (2) coupled thereto and a work implement (3). The pontoon is coupled to the boat part for pivoting movement in a vertical plane and the work implement projects outside the exterior configuration of the unit (1, 2) formed by the boat part and the pontoon. According to one method of delivering a load to a lighter from said apparatus, the pontoon (2) is rotated for driving said pontoon up onto a movable ramp so that the work implement (3) is positioned above the lighter, after which the work implement is actuated for delivering the load to the lighter.

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

APPARATUS AND METHOD FOR PERFORMING WORK AT SEADESCRIPTIONTechnical Field

The present invention relates to an apparatus and a method for performing work at sea. More specifically, the invention relates to an apparatus including a boat
5 part, with a buoyant body coupled thereto and a work implement, and to a method of delivering a load to a container in, or in association with a sea, lake or the like from such an apparatus.

Background Art

10 It is already known to arrange excavators and other apparatus on pontoons for taking up material or equipment from the lake or sea bed in shallow water. The greatest disadvantage with these apparatus is that stability will be insufficient, unless they are provided
15 with extra buoyant bodies and/or supporting legs.

It is further known to arrange apparatus for sinking implements to the sea bed to take up material or equipment, and to return these to the surface of the water after work by driving air into buoyancy tanks, but
20 neither do these apparatus solve the stability problems.

The Swedish Patent 75 13866-9 teaches apparatus which solves the stabilization problems by arranging an excavator on a frame which is carried by two upwardly and downwardly swingable pontoons, one on either side of
25 the frame.

Even if the latter apparatus has been found to function satisfactorily from the stability aspect, it is burdened with certain disadvantages, of which the greatest is perhaps that the excavation depth is heavily limited.
30 Another considerable disadvantage is that the delivery of excavated material cannot be made to a container positioned on land or floating in the water, for example, since the pontoons are arranged on both sides of the excavator in the conveying direction of the apparatus,
35 the alternative being to deposit the material in shallow



water where it may be taken care of by such as an excavator at the shoreline. A further disadvantage is that it is difficult to exchange the excavator for some other machine, inter alia due to its position
5 between the pontoons.

Disclosure of Invention

One object of the present invention is to remove the disadvantages with the above-mentioned, previously known apparatus and to provide an apparatus intended
10 for work at sea, which is relatively small and simple in its construction, is stable and assumes a substantially horizontal position on the water surface independent of whether it carries load or not, can work at relatively large depths or water, can perform different
15 kinds of work and can deliver the load to a container floating in the water or positioned on land.

This object is achieved by the invention being given the characterizing features disclosed in the claims.

20 Description of Figures

Fig. 1 is a schematic side view of an apparatus in accordance with the invention according to a first embodiment, floating on the water and not carrying any load,

25 Fig. 2 is a schematic side view of an apparatus in accordance with the invention according to a second embodiment, floating on the water and carrying a load, and

30 Fig. 3 is a schematic side view of a portion of the apparatus in Fig. 1, carrying and transporting a load to a container floating in the water.

Preferred Embodiments

The apparatus in accordance with the invention includes three main parts, namely a boat part 1, a
35 buoyant body or pontoon 2 in the form of a cylindrical drum coupled to the boat part to form a unit, and a



work implement 3. The boat part 1 is, inter alia, provided with a deckhouse 4 and driving means with propellers 5 (of which one is illustrated) as well as motors, steering and operating means etc. for
5 operating the different components of the apparatus, including the work implement 3.

Arms 6, pivotably mounted one on either side of the boat part 1, connect it to the pontoon 2, which is rotatably mounted on a shaft 7 connecting the arms.
10 An actuating means in the form of a piston cylinder device 8 connects each arm 6 to the boat part 1. An implement arm 9 is arranged pivotably on each arm 6 on either side of the boat part, to thrust out to the left past the pontoon 2 for carrying a quick-release
15 fastening 10, to which can be coupled some suitable implement. The implement is illustrated in Fig. 1 as a hinged bucket for taking up material, and in Fig. 2 in the form of a lime spreading unit, including a container 11 for powdered lime and a pump 12 for spreading
20 lime mixed with water through a pipe 13. Other implements (not shown), which can to advantage be coupled to the quick fastener 10 are such as apparatus for reed cutting, oil decontaminating, piling, log retrieving and post erecting. The fastening 10 is pivotably mounted on the
25 arms 9 and can be pivoted in a vertical plane by at least one actuating means such as a piston-cylinder device 14, acting between the arms 9 and the fastening. The implement arms 9 are pivotable, with the aid of an actuating means in the form of a piston-cylinder device 15 con-
30 necting each arm 6 and its associated implement arm 9, from the substantially horizontal position illustrated in Fig. 1, in which their right-hand portions engage against the undersides of the arms 6, to a substantially vertical position in which the implement is directly
35 under the unit 1, 2.

A pontoon 16 (only one illustrated) is pivotably



attached to each arm 6. The pontoons 16 can be pivoted by a suitable actuation means, e.g. in the form of a piston-cylinder device indicated at 17, between the upwardly lifted position illustrated in Fig. 1 and a position projecting out from the apparatus such that they rest on the water surface and stabilize the apparatus laterally during the execution of work and transport of load.

The pontoon 2 is driven for rotation, e.g. by a hydraulic motor mounted inside it and indicated at 18, and is provided on its cylindrical surface with strip-like projections 19, so as better to engage against the ground or a ramp described below.

The modus operandi of the apparatus will now be described.

With the parts of the apparatus assuming the positions illustrated in Fig. 1, it is moved with the aid of the propellers 5 to the place in the sea or lake where work is to be performed. The piston-cylinder device 17 is then actuated so that the pontoons 16 are moved down to the water surface. If the implement 3 is the bucket illustrated in Fig. 1, and dredging work is to be carried out, the piston-cylinder devices 15 are actuated so that the implement arms 9 are turned anti-clockwise until the bucket engages with the sea bed for taking up material from it. The piston-cylinder devices 14 are then actuated and the bucket closed, the piston-cylinder devices 15 then being actuated once again for turning the arms 9 clock-wise and lifting the bucket to its upper position above the water surface. The piston-cylinder devices 16 are actuated simultaneously as the piston-cylinder devices 15 for turning the arms 6 anti-clockwise about their mounting points on the boat part 1, so that the boat part will assume a horizontal position in the water. The size of the turn of the arms 6 depends on the weight of the material in the bucket and is greater the greater is the weight of the



material. The size of the turn of the arms 6 also depends of course on the displacement of the pontoons 2, the boat part 1 and the distance between them.

The above-described, second embodiment of the work implement 3 is illustrated carrying a load in Fig. 2, and it will be perceived from this figure that the boat part 1 has been turned clockwise relative the arms 6, so that it will assume a horizontal position on the water surface, and so that its center of gravity will be moved somewhat further away from the implement, thus increasing the lifting capacity of the implement 3. If the arms 6 had been rigidly connected to the boat part, the latter would have assumed a sloping position, with the deckhouse 4 lying lower in relation to the water surface, than its right-hand portion, thus causing certain stabilization problems, difficulties for the crew to be on the boat part and problems with equipment falling over in the boat part.

With the apparatus loaded, it is advanced with the aid of the propellers 5 towards the place where the load is to be deposited. If unloading is to take place on land, the propellers are stopped and the motor 18 started when the pontoon 2 engages against the ground, the pontoon being rotated anti-clockwise to move the entire apparatus onto land. Before moving onto land, it is suitable to actuate the piston-cylinder devices 8 to lift the boat part to the left in Fig. 1 upwards, so that its bottom will not come against any ground obstacle. During the advance onto land, a wheel 20, suitably made as a pontoon, and attached to the right-hand bottom portion of the boat part in Fig. 1, engages against the ground. When the load has been deposited, the apparatus can once again be returned to the lake or sea by rotating the pontoon 2 clockwise.



Unloading into a container or lighter 21 floating in the water can also take place. In such a case, the apparatus is advanced with the aid of the propellers 5 to a removably attached ramp 22 on the lighter in the manner illustrated in Fig. 3, after which the pontoon 2 is rotated anti-clockwise so that the pontoon engages with the ramp, which is suitably provided with strips 23 to prevent sliding between the ramp and the pontoon 2, which is also provided with strips 19. When the pontoon 2 is in its uppermost position on the ramp 22, the piston-cylinder device 14 is actuated and the bucket opened for delivering the load into the lighter 21. Return of the apparatus to the lake or sea takes place by rotating the pontoon 2 clock-wise.

A plurality of modifications of the illustrated and described embodiments, as well as further embodiments are possible within the scope of the invention, which is only limited by the disclosures in the claims.

20



CLAIMS

1. An apparatus intended for work at sea, including a boat part (1), a buoyant body (2) coupled to the boat part for pivoting movement relative to it in a vertical plane, and a work implement (3) projecting outside the outer configuration of the unit (1, 2) formed by the boat part and the buoyant body, c h a r a c t e r i z e d in that the buoyant body (2) projects out from the boat part (1) in a direction parallel to the advancing direction thereof, and, in a position at least partially above the water surface of the work implement (3), is situated between the work implement and the boat part.
2. Apparatus as claimed in claim 1, c h a r a c t e r i z e d in that the work implement (3) is pivotably mounted on members (6) connecting the boat part (1) and the buoyant body for pivoting movements between positions above and below the water surface, with the aid of at least one actuating means (15) acting between the work implement and said connecting members.
3. Apparatus as claimed in claim 1 or 2, c h a r a c t e r i z e d in that the buoyant body (2), which is pivotably mounted on the connecting means implemented as arms (6), comprises a drum rotatable by a motor (18) for engaging with the ground when the apparatus is advanced on land, during which actuating means (8), acting between the arms (6) and the boat part (1), lift the lower portion of the boat part facing towards the drum relative the arms, while the lower portion of the boat part facing away from the drum is carried by at least one wheel (20), preferably formed as a buoyant body.
4. Apparatus as claimed in claim 2 or 3, c h a r a c t e r i z e d in that the work implement (3) includes second arms (9) pivotably mounted on said arms (6), the ends of the former facing away from the mounting points carrying a preferably pivotable



fastening (10), to which may be coupled an excavator bucket or apparatus for reed cutting, lime spreading, piling, log retrieving, post erecting or oil decontaminating.

5 5. Apparatus as claimed in any of the preceding claims, characterized by two buoyant bodies (16) which are pivotably mounted on the apparatus such as to swing on either side of the apparatus between uplifted positions and positions where they
10 float on the water surface.

6. Method of delivering a load to a container from an apparatus intended for work at sea, including a boat part (1), a buoyant body coupled thereto in the form of a cylindrical, rotatably driven drum (2) and a
15 work implement (3), which projects out from the unit formed by the boat part and the drum, characterized in that the drum (2) is rotated for propelling it onto a preferably movable ramp (22) so that the work implement (3) projecting out in the
20 direction of advance of the apparatus is placed over a container (21) carrying the ramp, the container being positioned in, or in connection to, a lake or sea, after which the work implement is actuated for delivering the load to the container.

25



Fig. 1

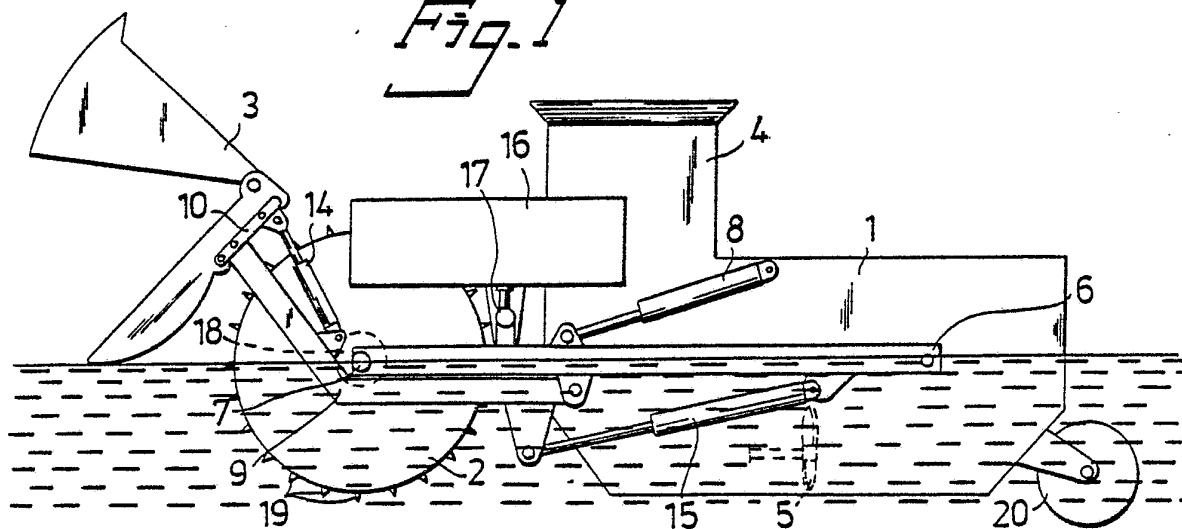


Fig. 2

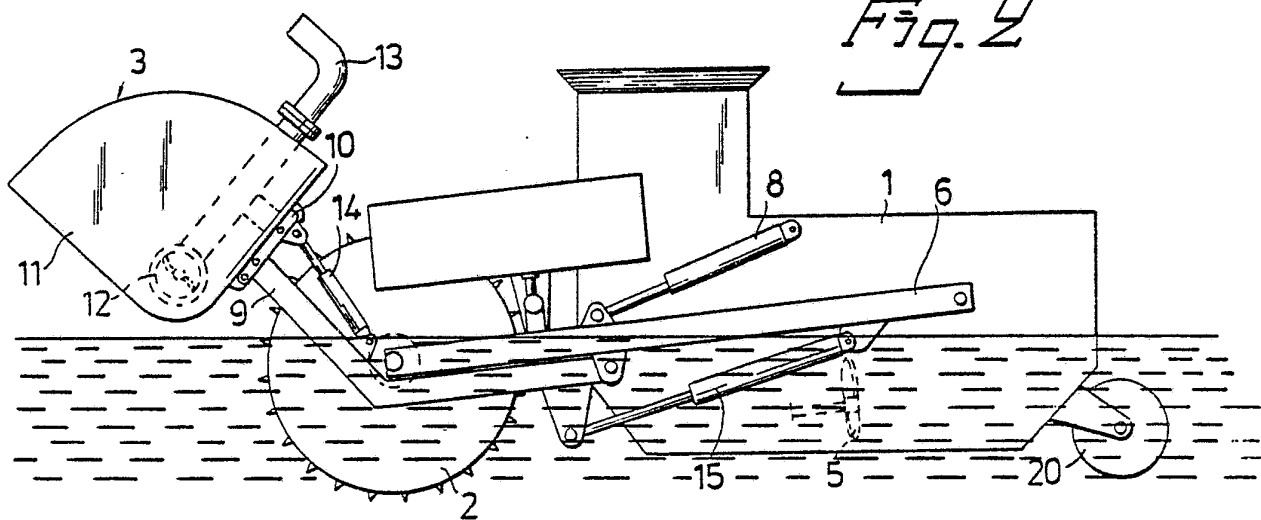
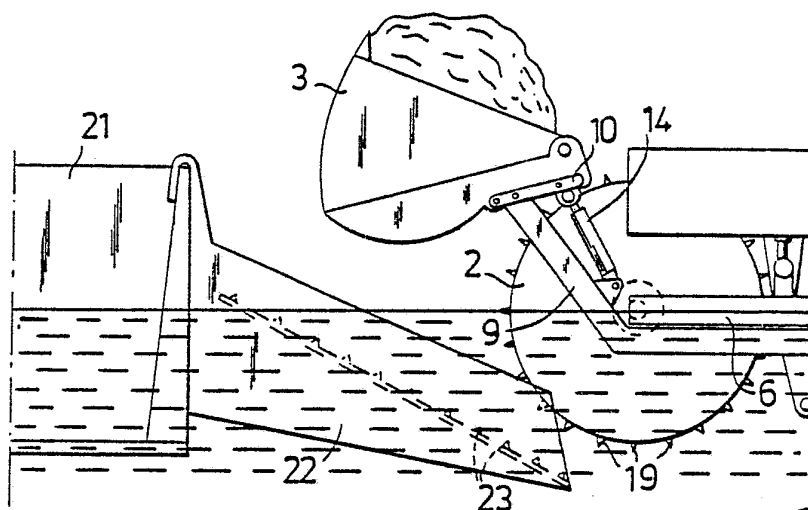


Fig. 3



INTERNATIONAL SEARCH REPORT

International Application No PCT/SE83/00236

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 ³ E 02 F 5/00																	
II. FIELDS SEARCHED Minimum Documentation Searched ⁴ <table border="1" style="width: 100%; border-collapse: collapse; margin-top: 5px;"> <thead> <tr> <th style="width: 25%;">Classification System</th> <th style="width: 75%;">Classification Symbols</th> </tr> </thead> <tbody> <tr> <td style="padding: 5px;">IPC 3</td> <td style="padding: 5px;">E 02 F 1/00, 3/00, 3/04, 3/76, 3/88, 5/00-02, 9/00, B 63 B 35/34, 43/14, B 66 C 23/52</td> </tr> <tr> <td style="padding: 5px;">US C1</td> <td style="padding: 5px;">37: 54-56, 71-76, 103 114: 52, 53, 685-700</td> </tr> </tbody> </table> Documentation Searched other than Minimum Documentation to the Extent that such Documents are Included in the Fields Searched ⁶ SE, NO, DK, FI classes as above			Classification System	Classification Symbols	IPC 3	E 02 F 1/00, 3/00, 3/04, 3/76, 3/88, 5/00-02, 9/00, B 63 B 35/34, 43/14, B 66 C 23/52	US C1	37: 54-56, 71-76, 103 114: 52, 53, 685-700									
Classification System	Classification Symbols																
IPC 3	E 02 F 1/00, 3/00, 3/04, 3/76, 3/88, 5/00-02, 9/00, B 63 B 35/34, 43/14, B 66 C 23/52																
US C1	37: 54-56, 71-76, 103 114: 52, 53, 685-700																
III. DOCUMENTS CONSIDERED TO BE RELEVANT ¹⁴ <table border="1" style="width: 100%; border-collapse: collapse; margin-top: 5px;"> <thead> <tr> <th style="width: 10%;">Category ⁸</th> <th style="width: 60%;">Citation of Document, ¹⁶ with indication, where appropriate, of the relevant passages ¹⁷</th> <th style="width: 30%;">Relevant to Claim No. ¹⁵</th> </tr> </thead> <tbody> <tr> <td style="text-align: center; vertical-align: top; padding: 5px;">A</td> <td style="padding: 5px;">US, A, 1 723 115 (A F ZICKGRAF) 6 August 1929</td> <td></td> </tr> <tr> <td style="text-align: center; vertical-align: top; padding: 5px;">A</td> <td style="padding: 5px;">US, A, 2 120 444 (C T SMITH) 14 June 1938</td> <td></td> </tr> <tr> <td style="text-align: center; vertical-align: top; padding: 5px;">A</td> <td style="padding: 5px;">US, A, 3 064 370 (S O LAFLEUR) 20 November 1962</td> <td></td> </tr> <tr> <td style="text-align: center; vertical-align: top; padding: 5px;">A</td> <td style="padding: 5px;">SE, B, 405 385 (J T SONERUD) 4 December 1978</td> <td></td> </tr> </tbody> </table>			Category ⁸	Citation of Document, ¹⁶ with indication, where appropriate, of the relevant passages ¹⁷	Relevant to Claim No. ¹⁵	A	US, A, 1 723 115 (A F ZICKGRAF) 6 August 1929		A	US, A, 2 120 444 (C T SMITH) 14 June 1938		A	US, A, 3 064 370 (S O LAFLEUR) 20 November 1962		A	SE, B, 405 385 (J T SONERUD) 4 December 1978	
Category ⁸	Citation of Document, ¹⁶ with indication, where appropriate, of the relevant passages ¹⁷	Relevant to Claim No. ¹⁵															
A	US, A, 1 723 115 (A F ZICKGRAF) 6 August 1929																
A	US, A, 2 120 444 (C T SMITH) 14 June 1938																
A	US, A, 3 064 370 (S O LAFLEUR) 20 November 1962																
A	SE, B, 405 385 (J T SONERUD) 4 December 1978																
¹⁸ * Special categories of cited documents: ¹⁵ "A" document defining the general state of the art which is not considered to be of particular relevance "E" earlier document but published on or after the international filing date "L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified) "O" document referring to an oral disclosure, use, exhibition or other means "P" document published prior to the international filing date but later than the priority date claimed "T" later document published 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 "X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step "Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art "&" document member of the same patent family																	
IV. CERTIFICATION <table border="1" style="width: 100%; border-collapse: collapse; margin-top: 5px;"> <tr> <td style="width: 50%; padding: 5px;"> Date of the Actual Completion of the International Search ¹ 1983-12-19 </td> <td style="width: 50%; padding: 5px;"> Date of Mailing of this International Search Report ² 1984-01-17 </td> </tr> <tr> <td style="width: 50%; padding: 5px;"> International Searching Authority ¹ Swedish Patent Office </td> <td style="width: 50%; padding: 5px;"> Signature of Authorized Officer ²⁰ Leif Törn </td> </tr> </table>			Date of the Actual Completion of the International Search ¹ 1983-12-19	Date of Mailing of this International Search Report ² 1984-01-17	International Searching Authority ¹ Swedish Patent Office	Signature of Authorized Officer ²⁰ Leif Törn											
Date of the Actual Completion of the International Search ¹ 1983-12-19	Date of Mailing of this International Search Report ² 1984-01-17																
International Searching Authority ¹ Swedish Patent Office	Signature of Authorized Officer ²⁰ Leif Törn																