



INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(51) International Patent Classification ³ : A47L 15/14; B08B 3/04	A1	(11) International Publication Number: WO 84/ 03616 (43) International Publication Date: 27 September 1984 (27.09.84)
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(21) International Application Number: PCT/SE84/00104

(22) International Filing Date: 23 March 1984 (23.03.84)

(31) Priority Application Number: 8301624-6

(32) Priority Date: 24 March 1983 (24.03.83)

(33) Priority Country: SE

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(81) Designated States: AT (European patent), AU, BE (European patent), CH (European patent), DE (European patent), FR (European patent), GB (European patent), JP, LU (European patent), NL (European patent), SE (European patent), US.

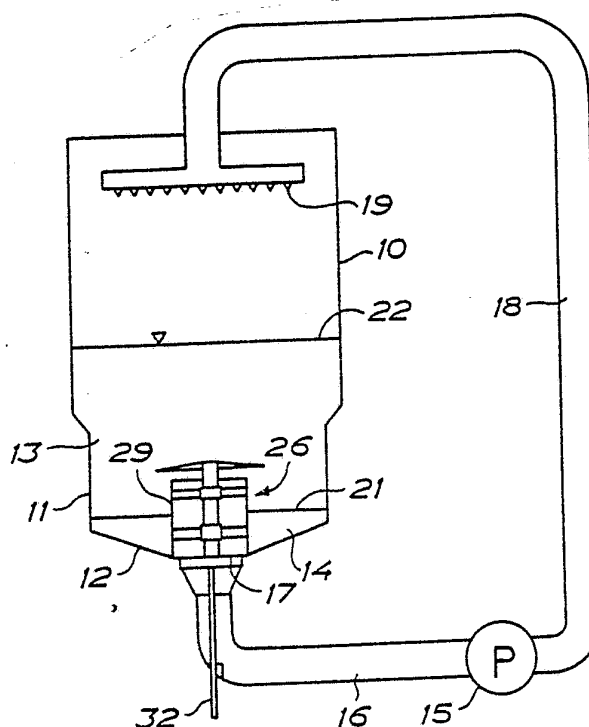
Published

*With international search report.
In English translation (filed in Swedish).*

(54) Title: METHOD IN A CLEANING MACHINE AND A CLEANING MACHINE FOR WORKING THE METHOD

(57) Abstract

Method in a cleaning machine wherein liquid is circulated alternatively with and without granules entrained therein, which are heavier than the liquid, liquid and granules or liquid only being drawn from a tank (11) by means of a pump (15) to be discharged therefrom under pressure towards the goods to be cleaned and is then allowed to flow back to the tank. Then, liquid only will be drawn from the tank at a level spaced above the surface (21) of a bottom layer (14) of granules in the tank while liquid and granules will be drawn from the bottom layer in the tank through a bottom outlet (17) of the tank. The invention also relates to a cleaning machine for working the method having an open-ended sleeve (29) which is guided to be vertically displaced between a position with the lower end engaging the bottom (12) of the tank (11) around a bottom outlet (17), and another position with the lower end lifted from the bottom.



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METHOD IN A CLEANING MACHINE AND A CLEANING MACHINE
FOR WORKING THE METHOD

5 The invention relates to a method in a cleaning
machine wherein liquid is circulated alternatively with
and without granules entrained therein, which are
heavier than the liquid, liquid and granules or liquid
only being drawn from a tank by means of a pump to be
10 discharged therefrom under pressure towards the goods
to be cleaned and being allowed then to flow back to
the tank.

Cleaning machines which function according to this
principle are provided with some type of retaining means
such as a grid or a sieve in the circulation system of
15 the liquid for separating the granules from the circulat-
ing liquid as desired. Means may be arranged to pass the
liquid alternatively through the retaining means or
past said means through a shunt line, or the retaining
means may be adjustable between a position in which it
20 extends as a closed valve across a flow passage for the
liquid so as to retain the granules, and another posi-
tion in which it is "open" in the passage such that the
granules are not prevented from passing through said
passage past the retaining means.

25 These known arrangements operate satisfactorily,
but it is endeavoured to reach a simpler arrangement and
above all to eliminate the use of a sieve or a similar
retaining means, because there may be a tendency of
clogging of the sieve or of the granules stagnating in
30 the sieve at a shocklike increase of the liquid flow.
Moreover, elimination of the retaining means may lead
to a simpler construction of the cleaning machine.

The invention relates to a contribution in this
direction, and according to the invention the method
35 referred to above has obtained the characteristics



according to the claim.

The invention also relates to an apparatus for working the method in accordance with claim 4.

5 For explanation of the invention in more detail reference is made to the accompanying drawing in which FIG. 1 is a very diagrammatic vertical sectional view of a cleaning machine for working the method of the invention,

10 FIG. 2 is a similar vertical sectional view of a modified embodiment of the cleaning machine for working the method of the invention, and

FIG. 3 is an enlarged vertical sectional view of a bottom valve of the embodiment shown in FIG. 2.

15 The cleaning machine shown in FIG. 1 comprises a treatment chamber 10 for the goods to be cleaned. E.g. heavily soiled goods to be washed may be involved. The lower portion of the treatment chamber, indicated at 11, can be separated from the treatment chamber proper by a transverse partition and can communicate with the
20 treatment chamber through an outlet opening in this transverse partition, but the lower portion can also as shown in the drawing directly merge into the treatment chamber proper. The portion 11 has a conical or pyramidal bottom 12 and forms a tank for receiving a
25 supply of liquid 13 (water) and a supply of granules 14 (plastic balls, sand or the like). A pump 15 coupled to an electric motor not shown herein is connected at the suction side of the pump by a conduit 16 to a central bottom outlet 17 in the bottom 12 of the tank, the
30 pressure side of the pump being connected by a conduit 18 to stationary or movable nozzles 19 at the top and/or the sides of the treatment chamber 10, said nozzles being directed towards the goods to be cleaned for rinsing the goods by means of liquid only or for "blasting"
35 the goods by means of liquid with granules entrained

therein.

A branch conduit 20 is connected to the conduit 16, and this branch conduit has a cross-sectional area which is smaller than that of the conduit 16 as well as that of the conduit 18, the cross-sectional areas of said latter conduits being equal. The branch conduit opens in the tank 11 at a position which is located above the surface 21 of the bottom layer of granules 14, which is present in the tank when the machine is not operating, but is located below the liquid surface 22 when the totally available amount of liquid under the same conditions is received in its entirety by the tank 11. The conduit 20 has a float valve 23 at the opening inside the tank, and a closure valve 24 is provided in the conduit 16 between the bottom outlet 17 and the position where the conduit 20 connects to the conduit 16.

The conduit 16 allows a larger flow than the conduit 20. E.g. a flow of 1,600 l/min can be allowed by the conduit 16 while a flow of 1,000 l/min only is allowed by the conduit 20. When the valve 24 is closed the pump 15 will draw liquid from the tank 11 through the conduit 20. Due to the liquid flow through this conduit the liquid level in the tank 11 will not sink below the indicated level 25. Thus, liquid only will be pumped for rinsing the goods in the treatment chamber 10.

If the valve 24 is now opened, the pump 15 will draw from the tank 11 through the conduit 16, and due to the large flow allowed by the conduit 16 the level in the tank 11 will sink below the level at which the conduit 20 is closed off by means of the float valve 23. Accordingly, granules as well as liquid will now be circulated such that the goods in the treatment chamber 11 will be "blasted".

The only measure that has to be taken for shifting between rinsing by means of liquid only and "blasting" by means of liquid and granules, is that the valve 24 has to be closed and opened, respectively.

5 The float valve 23 can be dispensed with and as a substitute for the valve 24 a threeway valve can be arranged where the conduits 16 and 20 join each other.

The level fluctuations in the tank 11 will be dependent on the amount of liquid or liquid and granules received in the conduit system during the circulation, and the circulation system accordingly must be dimensioned with due consideration thereof.

10 In FIG. 2, the same reference numerals are used as in FIG. 1. In this embodiment the conduit 20 and the valve 24 are replaced by a bottom valve 26 which is shown in more detail in FIG. 3. The valve comprises a stationary tube 27 projecting vertically centrally of the bottom outlet 17 and is attached to said outlet by means of a spider 28. An open-ended cylindrical sleeve 29 concentric with the tube and having a diameter which is larger than that of the bottom outlet is guided by means of spiders 30 and mounting sockets 31 for vertical movement on the tube 27 between the lower position shown and an upper position indicated by dot-and-dash lines. The displacement is effected by means of an operating bar 32 which is extended through the conduit 16 connected to the bottom outlet, in a suitable manner. The tube 27 has at the top end thereof a conical metal sheet 33 covering the sleeve 29.

25
30 When the sleeve is in the lower position shown by solid lines it seals against the bottom 12 around the bottom outlet 17 such that the granules 14 will be retained on the bottom while the pump 15 draws liquid only through the top end of the sleeve. If the sleeve is lifted by means of the bar 32 to the position shown

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by dot-and-dash lines, the pump can draw granules and liquid through the opening left between the sleeve and the bottom.

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CLAIMS

1. Method in a cleaning machine wherein liquid is circulated alternatively with and without granules entrained therein, which are heavier than the liquid, liquid and granules or liquid only being drawn from a tank to be discharged under pressure towards the goods to be cleaned and being allowed then to flow back to the tank, characterized in that liquid only is drawn from the tank (11) at a level spaced above the surface (21) of a bottom layer (14) of granules in the tank and that liquid and granules are drawn from the bottom layer in the tank through a bottom outlet (17) of the tank (11).

2. Method as claimed in claim 1, characterized in that liquid only is drawn from the tank at a first lower flow (volume/time unit) and that liquid and granules are drawn from the tank at a second, heavier flow (volume/time unit).

3. Method as claimed in claim 1, characterized in that said level is defined by a sleeve (29) resting on the bottom around the bottom outlet (17), which is lifted to uncover an opening between the sleeve and the bottom for drawing liquid and granules from the bottom layer (12) in the tank.

4. Cleaning machine with means for circulating liquid in a tank (11) alternatively with and without granules entrained therein, which are heavier than the liquid, and with a bottom outlet (17), characterized by an open-ended sleeve (29), which is guided to be displaced vertically for movement between a position with the lower end engaging the bottom (12) of the tank around the bottom outlet (17), and another position with the lower end lifted from the bottom.

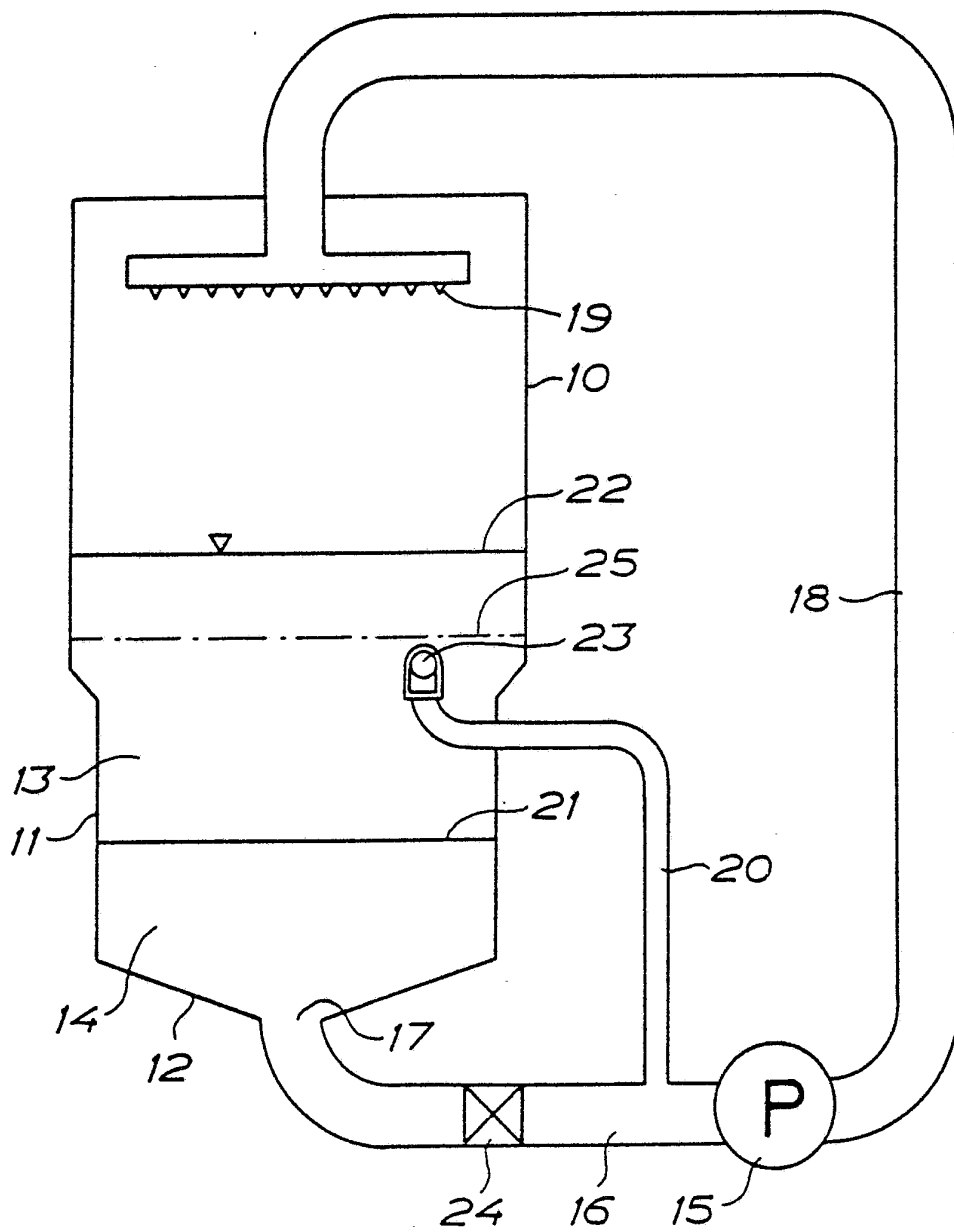


FIG. 1

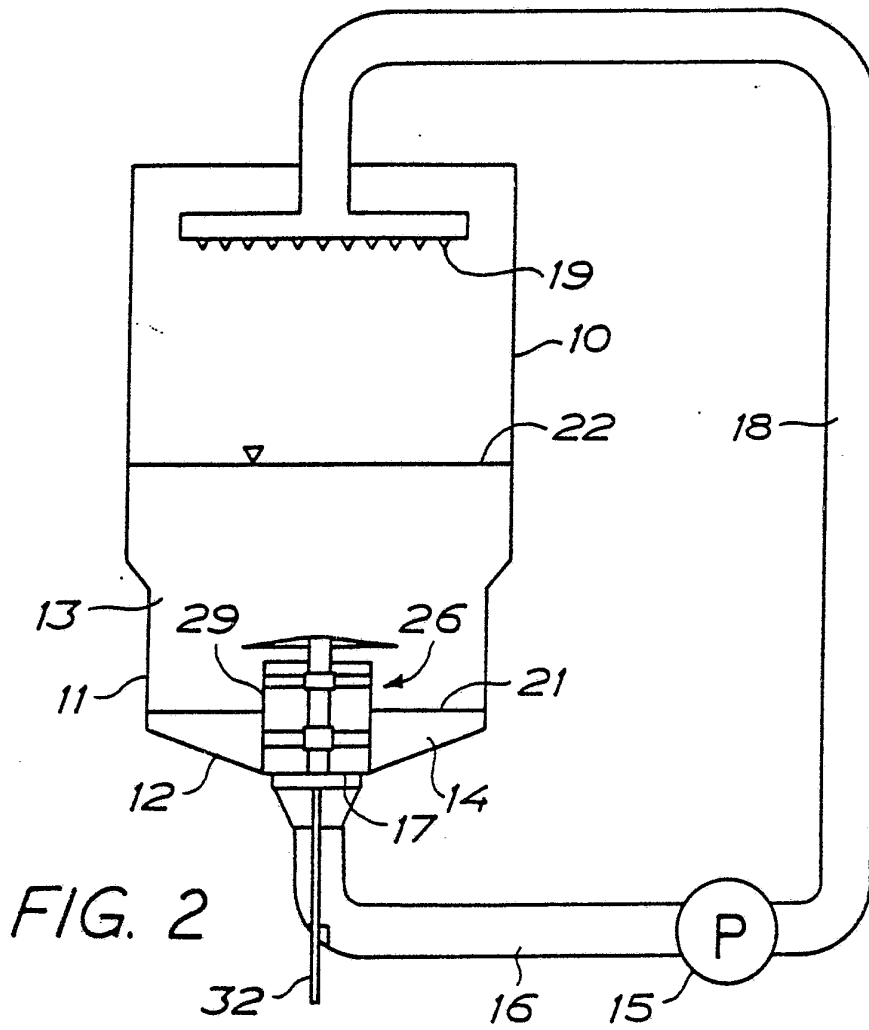


FIG. 2

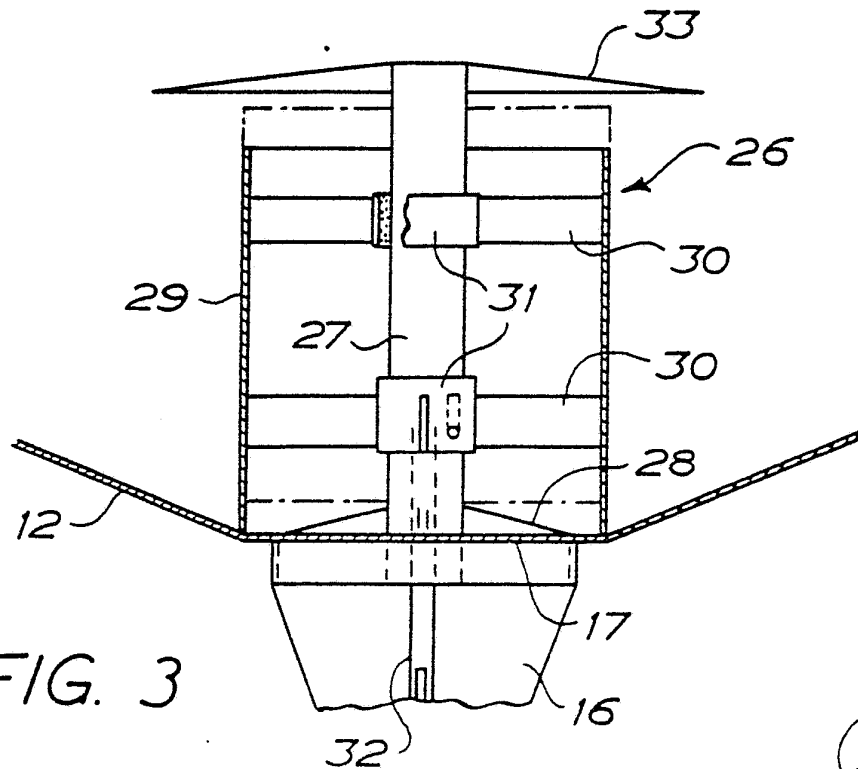


FIG. 3



INTERNATIONAL SEARCH REPORT

International Application No PCT/SE84/00104

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 <p style="text-align: center; margin: 5px 0;">A 47 L 15/14, B 08 B 3/04</p>																													
II. FIELDS SEARCHED <p style="text-align: center; margin: 5px 0;">Minimum Documentation Searched ⁴</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="width: 20%; padding: 2px;">Classification System</th> <th style="padding: 2px;">Classification Symbols</th> </tr> </thead> <tbody> <tr> <td style="padding: 2px;">IPC</td> <td style="padding: 2px;">A 47 L 15/00, 15/14-15/23, 15/42-15/46; B 08 B 3/00, 3/04, 3/10</td> </tr> <tr> <td style="padding: 2px;">National CI</td> <td style="padding: 2px;">34c:13/01, 13/06-13/10, 13/21 .../...</td> </tr> </tbody> </table> <p style="text-align: center; margin: 5px 0;">Documentation Searched other than Minimum Documentation to the Extent that such Documents are Included in the Fields Searched ⁵</p> <p style="margin: 10px 0;">SE, NO, DK, FI classes as above</p>			Classification System	Classification Symbols	IPC	A 47 L 15/00, 15/14-15/23, 15/42-15/46; B 08 B 3/00, 3/04, 3/10	National CI	34c:13/01, 13/06-13/10, 13/21 .../...																					
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III. DOCUMENTS CONSIDERED TO BE RELEVANT ¹⁴ <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="width: 10%; padding: 2px;">Category ⁶</th> <th style="padding: 2px;">Citation of Document, ¹⁵ with indication, where appropriate, of the relevant passages ¹⁷</th> <th style="width: 15%; padding: 2px;">Relevant to Claim No. ¹⁸</th> </tr> </thead> <tbody> <tr> <td style="text-align: center; padding: 2px;">A</td> <td style="padding: 2px;">SE, B, 419 820 (C.G.C MOSELL) 31 August 1981</td> <td style="text-align: center; padding: 2px;">1-4</td> </tr> <tr> <td style="text-align: center; padding: 2px;">A</td> <td style="padding: 2px;">FI, B, 47 722 (URHO ULJAS LEPPÄLÄ) 30 November 1973</td> <td style="text-align: center; padding: 2px;">1-4</td> </tr> <tr> <td style="text-align: center; padding: 2px;">A</td> <td style="padding: 2px;">DE, B, 1 148 360 (ORLANDO MORI) 9 May 1963</td> <td style="text-align: center; padding: 2px;">1-4</td> </tr> <tr> <td style="text-align: center; padding: 2px;">A</td> <td style="padding: 2px;">FR, A, 608 083 (FRATELLI CASOLETTI) 16 July 1926</td> <td style="text-align: center; padding: 2px;">1-4</td> </tr> <tr> <td style="text-align: center; padding: 2px;">A</td> <td style="padding: 2px;">JP, A, 54-54459 (HITACHI SEISAKUSHO KK) 28 April 1979</td> <td style="text-align: center; padding: 2px;">1-4</td> </tr> <tr> <td style="text-align: center; padding: 2px;">A</td> <td style="padding: 2px;">EP, A, 0 016 895 (MOSELL CARL GÖRAN CHRISTER) 15 October 1980</td> <td style="text-align: center; padding: 2px;">1-4</td> </tr> <tr> <td style="text-align: center; padding: 2px;">A</td> <td style="padding: 2px;">EP, A, 0 057 044 (MOSELL, CARL GÖRAN CHRISTER) 4 August 1982</td> <td style="text-align: center; padding: 2px;">1-4</td> </tr> <tr> <td colspan="3" style="text-align: center; padding: 2px;">.../...</td> </tr> </tbody> </table>			Category ⁶	Citation of Document, ¹⁵ with indication, where appropriate, of the relevant passages ¹⁷	Relevant to Claim No. ¹⁸	A	SE, B, 419 820 (C.G.C MOSELL) 31 August 1981	1-4	A	FI, B, 47 722 (URHO ULJAS LEPPÄLÄ) 30 November 1973	1-4	A	DE, B, 1 148 360 (ORLANDO MORI) 9 May 1963	1-4	A	FR, A, 608 083 (FRATELLI CASOLETTI) 16 July 1926	1-4	A	JP, A, 54-54459 (HITACHI SEISAKUSHO KK) 28 April 1979	1-4	A	EP, A, 0 016 895 (MOSELL CARL GÖRAN CHRISTER) 15 October 1980	1-4	A	EP, A, 0 057 044 (MOSELL, CARL GÖRAN CHRISTER) 4 August 1982	1-4	.../...		
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<ul style="list-style-type: none"> • Special categories of cited documents: ¹⁹ "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 		<ul style="list-style-type: none"> "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;"> <tr> <td style="width: 50%; padding: 2px;">Date of the Actual Completion of the International Search ²</td> <td style="padding: 2px;">Date of Mailing of this International Search Report ³</td> </tr> <tr> <td style="padding: 2px;">1984-06-21</td> <td style="text-align: center; padding: 2px;">1984-06-26</td> </tr> <tr> <td style="padding: 2px;">International Searching Authority ¹</td> <td style="padding: 2px;">Signature of Authorized Officer ²⁰</td> </tr> <tr> <td style="padding: 2px;">Swedish Patent Office</td> <td style="text-align: center; padding: 2px;"> Harriet Ekdahl </td> </tr> </table>			Date of the Actual Completion of the International Search ²	Date of Mailing of this International Search Report ³	1984-06-21	1984-06-26	International Searching Authority ¹	Signature of Authorized Officer ²⁰	Swedish Patent Office	Harriet Ekdahl																			
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Swedish Patent Office	Harriet Ekdahl																												

L.E.

FURTHER INFORMATION CONTINUED FROM THE SECOND SHEET

II

Fields searched (cont).

US C1 15:3,95;
 134:6, 7, 56-58, 93, 108-111, 151,
 172-181, 184-201

V. OBSERVATIONS WHERE CERTAIN CLAIMS WERE FOUND UNSEARCHABLE ¹⁰

This International search report has not been established in respect of certain claims under Article 17(2) (a) for the following reasons:

1. Claim numbers because they relate to subject matter ¹² not required to be searched by this Authority, namely:

2. Claim numbers because they relate to parts of the International application that do not comply with the prescribed requirements to such an extent that no meaningful International search can be carried out ¹³, specifically:

VI. OBSERVATIONS WHERE UNITY OF INVENTION IS LACKING ¹¹

This International Searching Authority found multiple inventions in this International application as follows:

1. As all required additional search fees were timely paid by the applicant, this International search report covers all searchable claims of the International application.

2. As only some of the required additional search fees were timely paid by the applicant, this International search report covers only those claims of the International application for which fees were paid, specifically claims:

3. No required additional search fees were timely paid by the applicant. Consequently, this International search report is restricted to the invention first mentioned in the claims; it is covered by claim numbers:

4. As all searchable claims could be searched without effort justifying an additional fee, the International Searching Authority did not invite payment of any additional fee.

Remark on Protest

The additional search fees were accompanied by applicant's protest.

No protest accompanied the payment of additional search fees.

III. DOCUMENTS CONSIDERED TO BE RELEVANT (CONTINUED FROM THE SECOND SHEET)

Category *	Citation of Document, ¹⁶ with indication, where appropriate, of the relevant passages ¹⁷	Relevant to Claim No ¹⁸
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A	US, A, 3 323 159 (RICHARD L. UMMEL AND WILLIAM E. KOEPPEN) 6 June 1967	1-4
A	US, A, 3 425 078 (FRANCISCO F. LAZAGA) 4 February 1969	1-4