

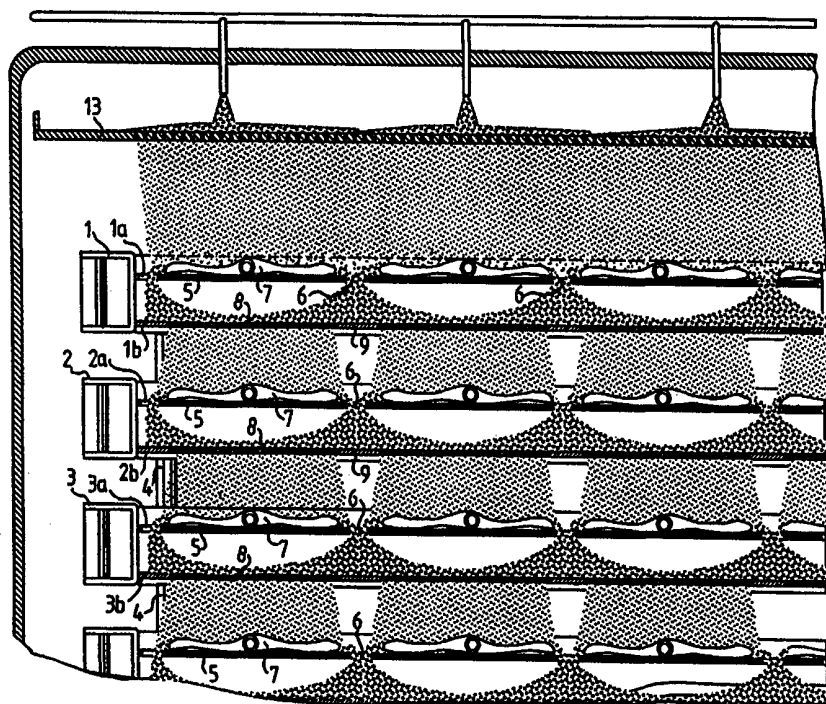
## INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

<b>(51) International Patent Classification</b> <sup>6</sup> : <b>A61L 2/04, 2/26 // B01J 3/04</b>	<b>A1</b>	<b>(11) International Publication Number:</b> <b>WO 99/27974</b> <b>(43) International Publication Date:</b> 10 June 1999 (10.06.99)
<b>(21) International Application Number:</b> PCT/SE97/01866 <b>(22) International Filing Date:</b> 7 November 1997 (07.11.97) <b>(71) Applicant (for all designated States except US):</b> GETINGE AB [SE/SE]; P.O. Box 69, S-310 44 Getinge (SE). <b>(72) Inventors; and</b> <b>(75) Inventors/Applicants (for US only):</b> CARLSSON, Göran [SE/SE]; Strömgatan 11, S-302 44 Halmstad (SE). SJÖHOLM, Bengt [SE/SE]; Fornminnesvägen 4, S-305 95 Påarp (SE). LUND, Thomas [SE/SE]; Skattgängen 15, S-302 44 Halmstad (SE). <b>(74) Agent:</b> AWAPATENT AB; P.O. Box 11394, S-404 28 Göteborg (SE).	<b>(81) Designated States:</b> AL, AM, AT, AT (Utility model), AU, AZ, BA, BB, BG, BR, BY, CA, CH, CN, CU, CZ, CZ (Utility model), DE, DE (Utility model), DK, DK (Utility model), EE, EE (Utility model), ES, FI, FI (Utility model), GB, GE, GH, HU, ID, IL, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MD, MG, MK, MN, MW, MX, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, SK (Utility model), SL, TJ, TM, TR, TT, UA, UG, US, UZ, VN, YU, ZW, ARIPO patent (GH, KE, LS, MW, SD, SZ, UG, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, CH, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, ML, MR, NE, SN, TD, TG).  <b>Published</b> <i>With international search report.</i> <i>In English translation (filed in Swedish).</i>	

**(54) Title:** SHELF ASSEMBLY IN AUTOCLAVES

**(57) Abstract**

The invention concerns a shelf assembly in autoclaves (12), the shelves of which serve as reception surfaces intended to support articles (7) to be sterilised by spraying the articles with hot water, which is made to be sprinkled over the articles (7) to be sterilised, from one shelf to the next of the shelf assembly. According to the invention, each one of said shelves (1, 2, 3) is subdivided into two shelf layers (1a, 1b; 2a, 2b; 3a, 3b). An upper layer (1a, 2a, 3a) is formed with perforated zones (5) designed to receive thereon the articles (7) to be sterilised, and with apertures (6) positioned intermediate the perforated zones. A lower layer (1b, 2b, 3b) is similarly formed with perforated zones (8), each one of which is located



below one of the perforated zones (5) of the upper layer (1a, 2a, 3a), said perforated zones (8) serving to allow passage-through and distribution of the sprinkling water over the articles (7) to be sterilised that are positioned on the shelf (2 or 3) located immediately below. The lower shelf layer (1b, 2b, 3b) is also provided with impervious zones (9) positioned between the perforated zones (8) of said lower layer and in vertical alignment with the respective apertures (6) formed in the upper layer (1a, 2a, 3a) above.

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SHELF ASSEMBLY IN AUTOCLAVES

The invention relates to a shelf assembly in autoclaves the shelves of which serve as reception surfaces intended to support articles to be sterilised. In the present case, the sterilisation is effected by spraying  
5 the articles with hot water, whereby the water is sprinkled over the articles to be sterilised that are positioned on the uppermost shelf of the assembly, through apertures formed in said shelf, and further downwards onto articles positioned on the shelf or  
10 shelves underneath.

As examples of articles sterilised in the manner indicated above in autoclaves utilising circulating hot water may be mentioned plastic bags containing nutrient solutions, plasma and other liquids given to hospital  
15 patients via intravenous drip. The plastic bags are placed in a number of rows on each shelf of the assembly, whereafter the entire shelf assembly is moved into an autoclave, which is then closed. It has been found, however, that the arrangement involving spraying the hot  
20 water from the top of the shelf assembly downwards through the shelves causes the water to be distributed unevenly, i.e. the plastic packages placed on the uppermost shelf receive the largest amount of water whereas the plastic packages placed on the shelves  
25 underneath are showered with progressively smaller amounts of water, since from the uppermost shelf part of the water flows laterally of or in between the packages on the lower shelves. This phenomenon occurs even though the shelves are perforated.

30 The above-mentioned phenomenon is highly unfavourable. By necessity, the autoclaving process has to continue for too long in order to ensure that also the packages on the lowermost shelves are sterilised. Owing to the nature of the package contents mentioned above,

they are temperature-sensitive, one serious consequence of which may be that the packages on the upper shelves run the risk of being spoiled due to having been exposed to the sterilisation process for too long.

5           One prior attempt to solve the problem of obtaining even distribution of the hot water that is sprinkled over the plastic packages involves changing the pattern in which the packages are placed on the shelves, by arranging them in a staggered manner such that a package on one  
10 shelf is positioned between two packages on the shelf immediately above and two packages on the shelf immediately below, and so on, with corresponding staggered package distribution upwards and downwards. An advantage with this manner of positioning the packages is that the  
15 water flowing downwards, in-between two packages falls down onto the middle of the package positioned between said packages on the shelf below.

          At the same time this arrangement suffers from several serious drawbacks. The capacity of the shelf  
20 assembly, for instance, is poorly utilised, with the result that a larger number of autoclaves may be required than would have been necessary, had each shelf been allowed to support a maximum number of packages. This is bad economy.

25           Another disadvantage has bearing on the step of loading the packages into the shelf assembly prior to the autoclaving process proper. Usually the loading step is effected by means of a robot which, when placing the packages on the shelves, follows a certain, comparatively  
30 simple pattern of movements. This pattern of movements becomes complicated, should it be necessary to place the packages in one shelf in a pattern that differs from that of the following shelf.

          It is likewise possible to provide nozzles on either  
35 side of the shelf assembly inside the autoclave. However, this is not either a satisfactory solution to the sterilisation problem and it is particularly disadvantageous

for the reason that such laterally positioned nozzles obstruct the path of movement of the shelf assemblies as the latter are moved into or out of the autoclave and thus, in the case of impacts, they may easily be damaged or may themselves cause damage to packages in the shelf assembly.

The present invention provides a shelf assembly by means of which the sterilisation process may be optimised because it allows the best possible distribution of the hot water uniformly across each and every package, also when the shelf assembly contains the maximum number of packages. The characteristic features of the invention appear from the appended claims.

The invention will be described in more detail in the following with reference to the accompanying drawings, wherein

Fig 1 is a perspective view of one shelf unit of a shelf assembly with parts broken away, and

Fig 2 is a vertical sectional view through an autoclave and a shelf assembly supporting packages, during the progress of a sterilisation process.

The shelf assembly in accordance with the invention is constructed from shelves 1, 2, 3 and so on, usually in the number of 15-20 shelves. The primary characteristic feature of the invention is the subdivision of each one of said shelves into two shelf layers, one upper layer 1a, 2a, 3a and so on, and one lower layer 1b, 2b, 3b, and so on. The shelves 1, 2, 3 are stacked one on top of the other and they are maintained in their spaced-apart relationship by means of insert spacer pins 4, said pins also preventing relative lateral movements of the shelves. Each upper layer 1a, 2a and 3a, and so on consists of a plate formed with perforated zones 5 and with openings 6 positioned between said perforated zones. Packages 7 to be sterilised are intended to be placed on top of the perforated zones 5.

In a corresponding manner each lower layer 1b, 2b, 3b, and so on, consists of a plate formed with perforated zones 8, which are positioned below their respective perforated zones 5 in the upper shelf layer 1a, 2a, 3a, and so on. The lower layers 1b, 2b, 3b, and so on are formed with impervious zones 9, which are located between the perforated zones 8 and below and vertically aligned with the openings 6 formed in the respective upper layers 1a, 2a, 3a, and so on.

10 Along one of its sides, or as shown in Fig 1 along two opposite sides, each lower layer 1b, 2b, 3b, and so on merges with a wall 10 in which is formed a number of drainage holes 11 serving as a spillway means.

Fig 2 illustrates the shelf assembly in accordance with the invention when positioned inside an autoclave 12 during a sterilising process. Hot water passes through a perforated sheet-metal plate 13 positioned underneath the cover of the autoclave and further downwards onto the packages 7 positioned on the uppermost shelf layer 1a. 15 The water flows off the packages 7 and downwards through the openings 6 on either side of the packages. The holes in the perforated zones 5 are comparatively small and are intended primarily to prevent the formation of air pockets underneath the packages 7. The water flows 20 further downwards onto and across the lower shelf layer 1b, across which it spreads and trickles through the holes formed in the perforated zones 8 of the lower shelf layer 1b, onto the packages 7 positioned on the shelf layer 2a immediately below. The impervious zones 9 25 prevent the water from flowing linearly downwards, between and past the latter packages 7. The process is repeated from one shelf to the next, with the result that all layers of packages 7 will be showered by essentially identical amounts of hot water. In this manner, the 30 sterilising process will be effected to the same extent simultaneously throughout the entire shelf assembly, and consequently the process may be performed in the shortest 35

possible time while at the same time ensuring that no package contents will be exposed to prolonged sterilisation that may cause them to be spoiled.

5 The purpose of the drainage apertures 11 is to handle water that for some reason or other has collected on top of the lower layer 1b, 2b, 3b, and so on, for example on account of too large amounts of water passing through the plate 13 or because of clogging of the holes in the perforated zones 8.

10 The invention is not limited to the features shown and described herein but may be varied in several ways within the scope of the appended claims. This is true for example both with respect to the spacing between two layers and to the spacing between two shelves of the shelf assembly.

15 It should be emphasised that the shelf assembly is well suited for its intended purpose also when it comes to the cooling process that succeeds the sterilising process, during which instead of hot water cooling water is made to pass through the plate 13 downwards onto the packages 7, from one shelf to the next of the shelf assembly.

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## CLAIMS

1. A shelf assembly in autoclaves (12) the shelves of which serve as reception surfaces intended to support articles (7) to be sterilised by spraying the articles with hot water, whereby the water is sprinkled over the articles (7) to be sterilised that are positioned on the uppermost shelf (1) of the assembly, through apertures (6) formed in said shelf, and further downwards onto articles (7) positioned on the shelf or shelves (2, 3) underneath, characterised in that each one of said shelves (1, 2, 3) is subdivided into two shelf layers (1a, 1b; 2a, 2b; 3a, 3b), one upper layer (1a, 2a, 3a) which is formed with perforated zones (5) designed to receive thereon the articles (7) to be sterilised, and with apertures (6) positioned intermediate the perforated zones, and one lower layer (1b, 2b, 3b), which is similarly formed with perforated zones (8), each one of which is located below one of the perforated zones (5) of the upper layer (1a, 2a, 3a), said perforated zones (8) serving to allow passage-through and distribution of the sprinkling water over the articles (7) to be sterilised that are positioned on the shelf (2 or 3) located immediately below, and in that the lower shelf layer (1b, 2b, 3b) is also provided with impervious zones (9) positioned between the perforated zones (8) of said lower layer and in vertical alignment with the respective apertures (6) formed in the upper layer (1a, 2a, 3a) above.

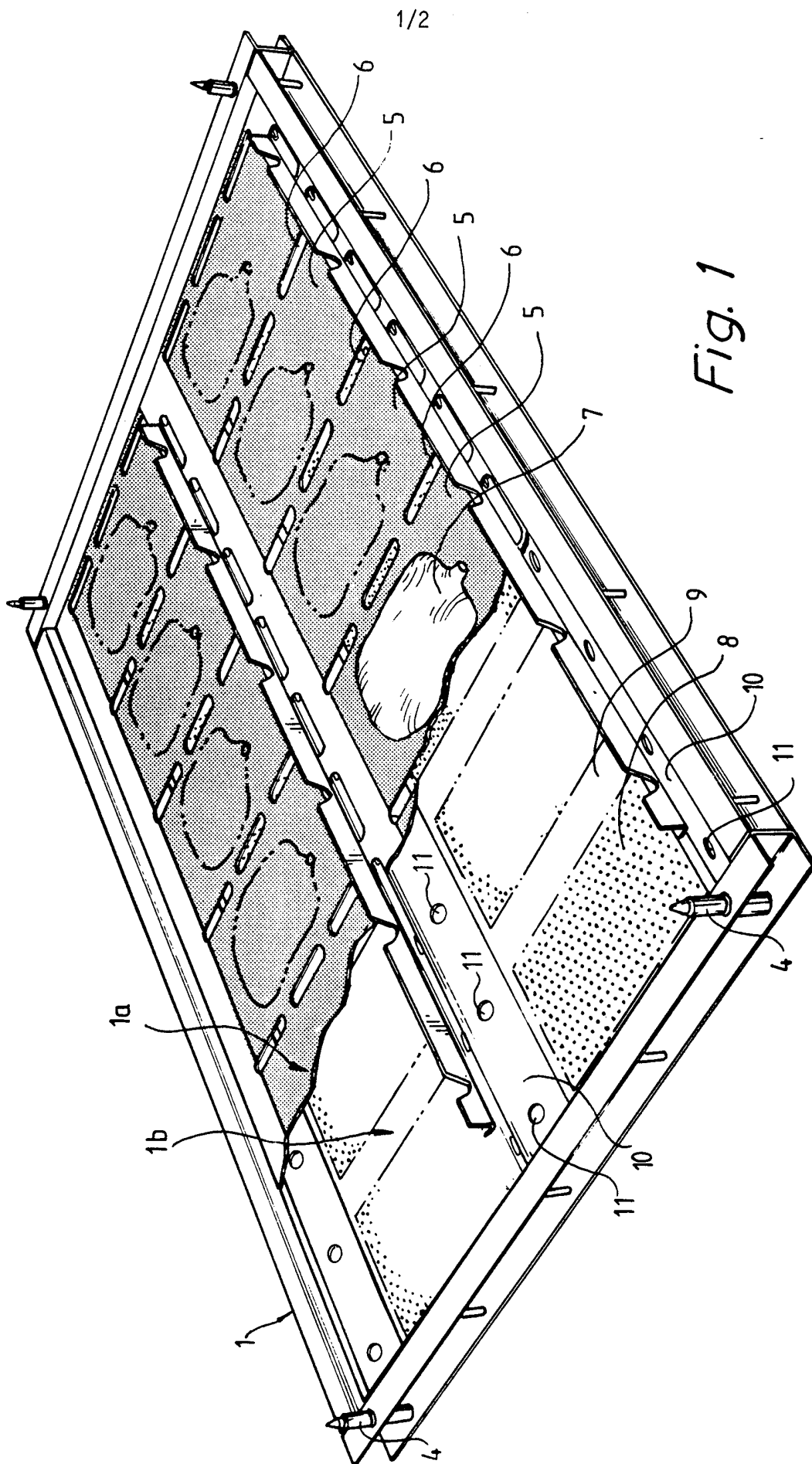
2. A shelf assembly as claimed in claim 1, characterised in that the holes of the perforated zones (8) of the lower shelf layer (1b, 2b, 3b) are slightly larger than the holes formed in the perforated zones (5) of the upper shelf layer (1a, 2a, 3a).

3. A shelf assembly as claimed in any one of the preceding claims, characterised in that along at least one of its sides, said lower shelf layer (1b, 2b, 3b) merges with a wall (10) in which is provided



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a number of drainage holes (11) serving as a spillway means.



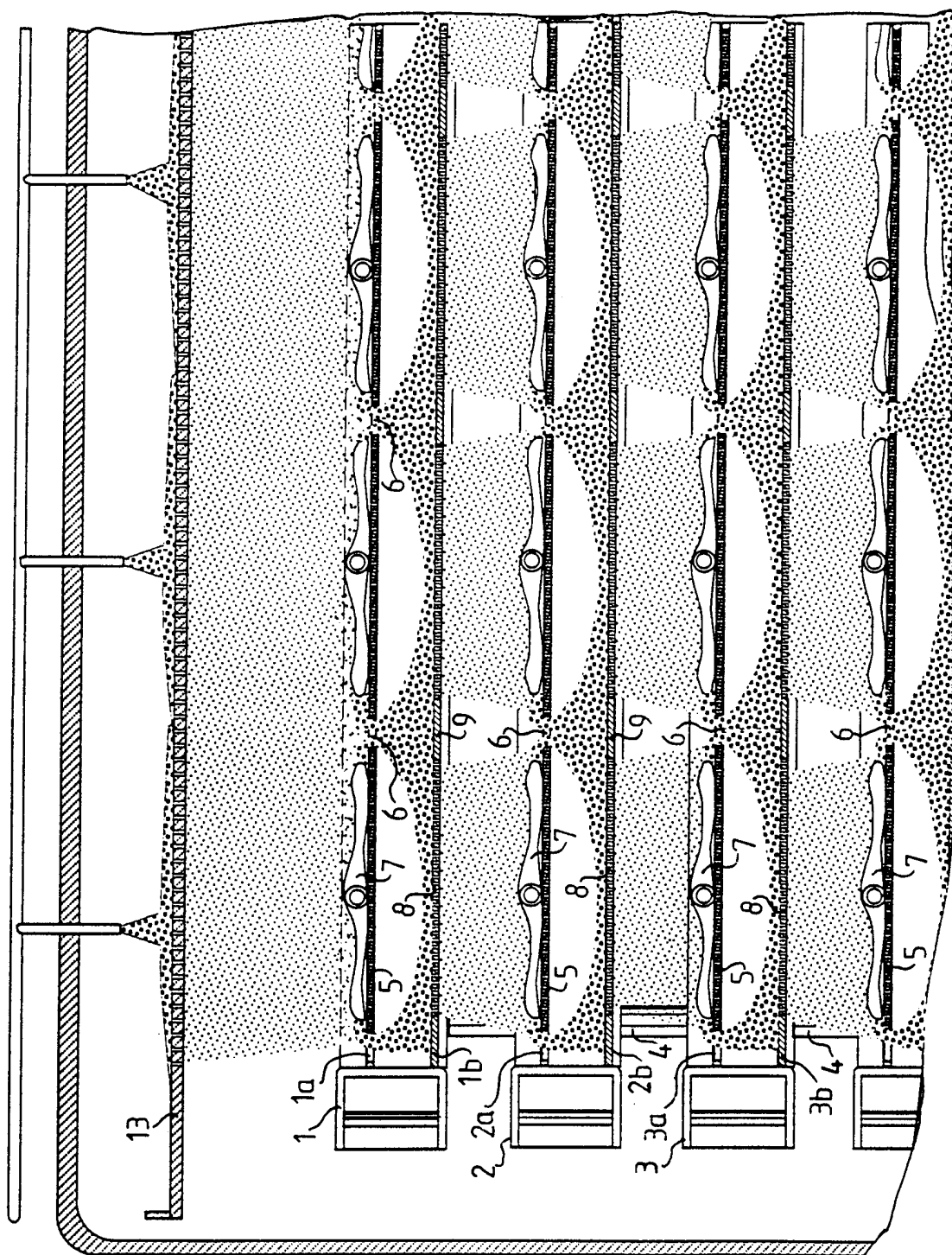


Fig. 2

## INTERNATIONAL SEARCH REPORT

International application No.

PCT/SE 97/01866

<b>A. CLASSIFICATION OF SUBJECT MATTER</b>		
<b>IPC6: A61L 2/04, A61L 2/26 // B01J 003/04</b> According to International Patent Classification (IPC) or to both national classification and IPC		
<b>B. FIELDS SEARCHED</b>		
Minimum documentation searched (classification system followed by classification symbols)		
<b>IPC6: A61L, B01J</b>		
Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched		
<b>SE,DK,FI,NO classes as above</b>		
Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)		
<b>WPI</b>		
<b>C. DOCUMENTS CONSIDERED TO BE RELEVANT</b>		
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	WPI/Derwent's abstract, N097-006419, week9701, ABSTRACT OF JP,8275990 (CHIYODA SEISAKUSHO KK), 961022, figures 1-3, abstract --	1-3
A	EP 0400459 A1 (MMM MÜNCHENER MEDIZIN MECHANIK GMBH), 5 December 1990 (05.12.90), figures 1-2, abstract --	1-3
A	US 4576792 A (KARL I.M. MÄRTENSSON), 18 March 1986 (18.03.86), figure 1, abstract --	1-3
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C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT		
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	WPI/Derwent abstract, N095-227372, week 9530, ABSTRACT OF JP,7135940 (HOUSE SHOKUHIN KOGYO KK), 950530  -- -----	1-3

**INTERNATIONAL SEARCH REPORT**

Information on patent family members

09/06/98

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