(12) PATENT ABRIDGMENT (11) Document No. AU-B-18065/88
(19) AUSTRALIAN PATENT OFFICE (10) Acceptance No. 615452

(54) Title
INSULATING PANEL

International Patent Classification(s)
(51)[4] **D21J 001/20** **D21J 001/00** **D21J 003/12**

(21) Application No. : **18065/88** (22) Application Date : **29.04.88**

(87) PCT Publication Number : **WO89/10449**

(43) Publication Date : **24.11.89**

(44) Publication Date of Accepted Application : **03.10.91**

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(56) Prior Art Documents
US 4622190
EP 84917
US 3748222

(57) Claim

1. A method of producing heat and sound insulating panels from raw materials which are in the recycled or prime state, and which consist of fibres of cellulose and agglomerated vegetable waste, comprising the preparation of the raw materials, the preparation and homogenisation of the pulp, the preforming and drying of the panels, characterised in that:

1. The homogenised pulp emanating from a dispenser is conveyed into the preforming machine (1) on an endless shaping wire cloth (3) of the paper-making type which serves successively to support and drain the pulp during pressing and preforming and as a means of handling the preformed panel and of removing it from the preforming machine (1);

2. The preformed panel is introduced into a tunnel oven (5) of the double-sided percussion type, the hot air being blown onto both faces of the panel to be dried in a forced and very uniform fashion at a temperature comprised between 185°C and 200°C.

OPI DATE 24/11/89 APPLN. ID 18065 / 88
AOJP DATE 21/12/89 PCT NUMBER PCT/BE88/00013

PCT ORGANISATION MONDIALE DE LA PROPRIETE INTELLECTUELLE Bureau international

DEMANDE INTERNATIONALE PUBLIEE EN VERTU DU TRAITE DE COOPERATION EN MATIERE DE BREVETS (PCT)

(51) Classification internationale des brevets[4] : D21J 1/00, 1/20, 3/12

A1

(11) Numéro de publication internationale: WO 89/10449

(43) Date de publication internationale: 2 novembre 1989 (02.11.89)

(21) Numéro de la demande internationale: PCT/BE88/00013

(22) Date de dépôt international: 29 avril 1988 (29.04.88)

Publiée
Avec rapport de recherche internationale.

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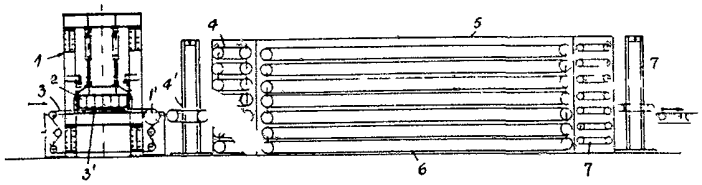
(81) Etats désignés: AT (brevet europeen), AU, BE (brevet europeen), CH (brevet europeen), DE (brevet europeen), FR (brevet europeen), GB (brevet europeen), IT (brevet europeen), JP, LU (brevet europeen), NL (brevet europeen), SE (brevet europeen), SU, US.

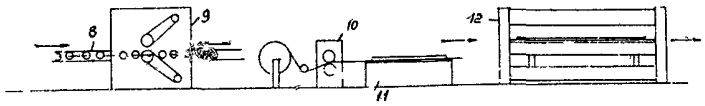
(54) Title: PROCESS FOR MANUFACTURING HEAT-INSULATING AND SOUNDPROOFING BOARDS AND SOUNDPROOFING MATERIALS AND BOARDS SO OBTAINED

(54) Titre: PROCEDE DE FABRICATION DE PANNEAUX ISOLANTS, THERMIQUES ET ACOUSTIQUES, ET ABSORBANTS PHONIQUES ET PANNEAUX REALISES SUIVANT LE PROCEDE

(57) Abstract

In the process disclosed, pulp mixed in a dosing device is introduced into the pre-shaping device (1) on an endless shaping web (3), for example a papermaking machine wire web, which serves successively for support and drainage of the pulp during pressing and pre-shaping and as a means for handling the pre-shaped board to remove it from the pre-shaping device (1). The pre-shaped board is then introduced into a tunnel furnace (5) with double-sided percussion in which the hot air at a temperature of 185 to 200°C is blown forcibly and very uniformly onto the two faces of the board to be dried.





(57) Abrégé

Suivant le procédé de fabrication de panneaux isolants 1) la pâte homogeneisee provenant d'un doseur est amenée dans la préformeuse (1) sur une toile sans fin de formation (3), du type toile de formation de papeterie, servant successivement au support et a l'egouttage de la pâte lors du pressage et du preformage et de moyen de manutention du panneau preforme pour son evacuation hors de la preformeuse (1); 2) le panneau préforme est introduit dans un four tunnel (5) a percussion double face, l'air chaud étant soufflé sur les deux faces du panneau à secher d'une manière forcee et tres uniforme a une temperature comprise entre 185°C et 200°C.

VERIFIED TRANSLATION OF : 18065/88

A method of and an apparatus for producing heat and sound insulating panels and soundproofing substances and also panels produced by the said method

The present invention relates to insulating panels made from raw materials which have been recycled or which are in prime condition, consisting of cellulose fibre and agglomerated vegetable waste and more particularly straw and paper in bulk or in bales and emanating from selective crops.

The production of this type of panel, according to the Patent EP-A-0 084 ^17, is performed in a single shaping operation under very low pressure of around 1 kg/sq.cm on a pulp originating from the preparation of cellulose fibres and vegetable waste mixed with a suitable quantity of water in a machine referred to as a 'preforming' machine. This shaping is followed by drying in a continuous oven which leaves a quantity of air cavities intended to impart the required properties to the panel.

The object of the invention is to invest in the method as described hereinabove new characteristic properties which improve the various phases of the process and make it possible to obtain a dry self-supporting felted material which will not break, is not deformed and will withstand a compression stress of 160 KN/sq.m with a maximum deformation of 10%.

To achieve this object, the method of producing insulating panels according to the invention is characterised in that:

1. The homogenised pulp emanating from a dispenser is conveyed into the preforming machine (1) on an endless shaping wire cloth (3) of the paper-making type which serves successively to support and drain the pulp during pressing and preforming and as a means of handling the preformed panel and of removing it from the preforming machine (1);
2. The preformed panel is introduced into a tunnel oven (5) of the double-sided percussion type, the hot air being blown onto both faces of the panel to be dried in a forced and very uniform fashion at a temperature comprised between 185°C and 200°C.

Again according to the invention, the drive and automatically calibrated panel covered on each side with glue and a layer of cardboard is introduced into a heating press which simultaneously hardens the glue and produces an indentation around the perimeter of the panel.

Further characteristic features will become apparent from the ensuing description, which is based on the accompanying drawings in which:

Figs. 1A and 1B show in elevation the main phases of the operating diagram, and
Fig. 2 is a partial view of the heating press on an enlarged scale.

At the outset, a panel according to the invention is, for example, produced from the following materials: straw, paper in bulk or in bales, mains water and drainage water, recycled chips emanating from the calibration and machining stages.

Using these materials, the pulp is prepared in a pulper, homogenised and then passed to a dispenser which feeds a

preforming machine 1, in which the floating platen 2 is carried on an endless forming wire cloth 3 of the type used in paper making. The movable platen 3, operated by jacks, slides downwardly until the required pressure is reached, which will be around 1.1 kg/sq.cm to 4 kg/sq.cm. The wire cloth 3 serves to support the pulp and to drain it during pressing and preforming and also serves as a means of handling the preformed panel in order to remove it from the preforming machine and, using a raising-lowering means 4', transfer it rapidly to a two-speed conveyor 4.

The wire cloth 3 is driven by cylinders 1' which comprise suitable means for controlling displacement and centring. These cylinders 1' are provided with a system of cleaning involving scraping and spraying on water. In order to distribute the compression stresses over the forming wire cloth 3, an intermediate perforated plate 3' is fixed on the grille which is attached to the preforming machine and the said wire cloth 3 slides over it.

The two-speed conveyor 4 slowly introduces the preformed panel into the tunnel oven 5 which is fitted with a plurality of staged conveyors which permit of production on several parallel levels 6. Drying in the oven is carried out under very accurately repetitive conditions aimed at eliminating a clearly defined percentage of water from the preformed panel and amounting to 65% to 75% in relation to the total weight of the cake. After drying, the water elimination leaves a number of air cavities which give the panel its heat and soundproofing properties as well as its felted strength. The continuous oven operates at a temperature of between 185°C and 200°C and the hot air is distributed over both faces of the panel in a forced and very uniform manner at a velocity which is between 13 m/sec and 18 m/sec. The drying time will depend upon the thickness of the panel. The conditions required for drying

make it possible to obtain optimum treatment of the material and to preserve its properties throughout production.

The dry panels are discharged from a two-speed conveyor 7 (upwards-downwards displacing means 7') automatically onto pallets or they are introduced directly by a belt conveyor 8 into a double-sided calibrator 9 in which the panel is automatically calibrated and sanded.

The calibrated panel is then passed to a palletiser, or to a gluing stage 10 or a stage 11 where it is covered with a layer of cardboard on each side before entering a heating press 12 which causes the glue to harden. Simultaneously, the perimeter of the panel is given an indentation in this heating press 12. The edges are thinned by compression in the form of a chamfer 4 cm to 6 cm wide and 2 mm to 4 mm deep on all four sides of the panel. This allows the user to join the edges of the panels in an always sealing-tight and solid fashion by means of a strip of glass fibre glued into the hollow created by the chamfers on the two juxtaposed panels. Finishing is then quite straightforward, using a layer of filler and a finishing coat.

Forming of the chamfer in the heating press 12 which is intended for gluing the final surfacing on the panel is shown in Fig. 2, which shows the fixed heating platen 13 with a thicknessing wedge 14, the movable heating platen 15 mounted on hydraulic jacks 16 and provided with a counter-form 17 for shaping the chamfer, the panel 18 with the flue 19 and the surfacing material 20. The thinning of the edges of the panel and the polymerisation of the glue for gluing on the surfacing material are carried out in one single heat-pressing operation.

Upon leaving the heating press, the panel is sawn square on all four sides, placed on a pallet and stored.

Cellulose and vegetable waste were mentioned in the preamble as raw materials intended for producing panels. The term 'cellulose' is intended to designate either the cellulose emanating from old and mixed papers from selective crops, defibred with water in a conventional pulper to form a pulp, or the cellulose produced from vegetables such as papyrus, sugar cane trash, wood, leaves of banana trees and any fibrous vegetables of the same type defibred to form a pulp.

The term vegetable waste is intended to mean vegetable substances regarded as residues of manufacture such as coffee bean parchment, bran, rice bran, rice chaff and any other husks of grain, straw from cereals and rice, sawdust and wood chips.

Patent claims

1. A method of producing heat and sound insulating panels from raw materials which are in the recycled or prime state, and which consist of fibres of cellulose and agglomerated vegetable waste, comprising the preparation of the raw materials, the preparation and homogenisation of the pulp, the preforming and drying of the panels, characterised in that:

1. The homogenised pulp emanating from a dispenser is conveyed into the preforming machine (1) on an endless shaping wire cloth (3) of the paper-making type which serves successively to support and drain the pulp during pressing and preforming and as a means of handling the preformed panel and of removing it from the preforming machine (1);

2. The preformed panel is introduced into a tunnel oven (5) of the double-sided percussion type, the hot air being blown onto both faces of the panel to be dried in a forced and very uniform fashion at a temperature comprised between 185°C and 200°C.

2. A method of producing insulating panels according to Claim 1, characterised in that the preforming is carried out in one single operation at a pressure of 1.1 kg/sq.cm to 4 kg/sq.cm.

3. A method of producing insulating panels according to Claim 1, characterised in that the endless forming wire cloth (3) is driven by cylinders (1') which permit control of its displacement and centring and slides over a perforated plate (3') to distribute the compression stresses over the wire cloth (3).

4. A method of producing insulating panels according to Claim 1, characterised in that the preformed panel, prior to drying, contains a percentage of water amounting to around 65% to 75% of the total weight of the cake.

5. A method for producing insulating panels according to claim 1, characterised in that in the tunnel oven (5) the hot air is distributed at a velocity which is between 13 m/sec and 18 m/sec.

6. A method of producing panels according to any one of claims 1 to 5, characterised in that the panel (18), dried, automatically calibrated in a double-sided sander-calibrater and covered on each face with glue (19) and a layer of cardboard (20) is introduced into a heating press (12) which simultaneously carries out polymerisation of the glue for adhesion of the surfacing material and the making of an indentation or chamfer over the perimeter of the panel by the provision of a matching shaping member (17) on the movable heating platen (15) of the press (12).

7. An insulating panel having simultaneously intrinsic qualities of heat and sound insulation, crude, sanded, calibrated and/or covered with a surfacing material and produced according to the manufacturing process described in any one of claims 1 to 6.

8 A method of producing insulating panels substantially as hereinbefore described with reference to the accompanying drawings.

9. An insulating panel produced by the method of any one of claims 1-7 substantially as hereinbefore described with reference to the accompanying drawings.

DATED this 24 day of July 1991

TERRE ENGINEERING SA
Patent Attorneys for the
Applicant:

F.B. RICE & CO.

FIG.1A

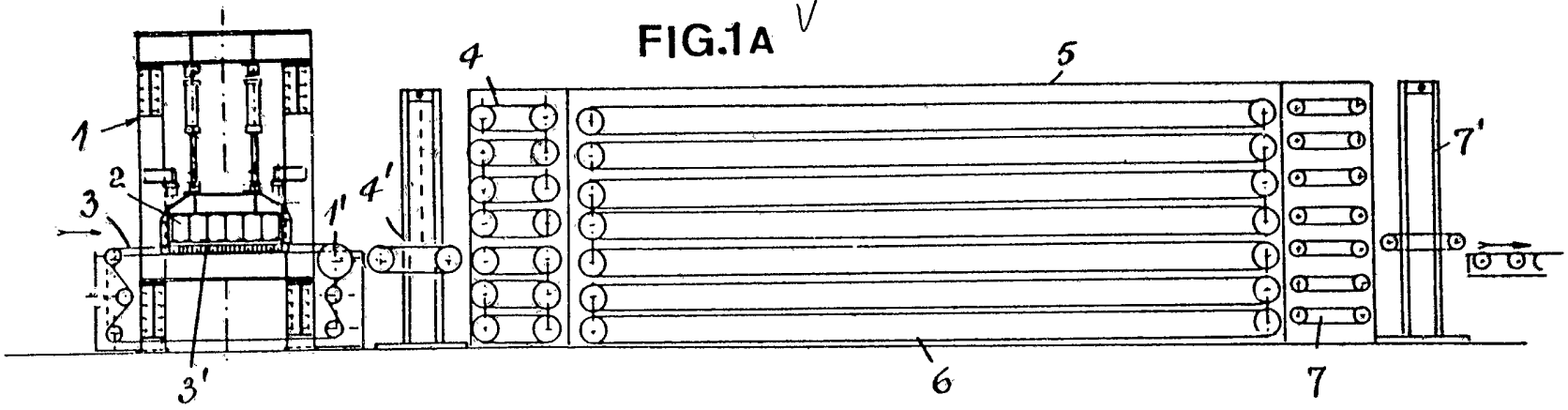
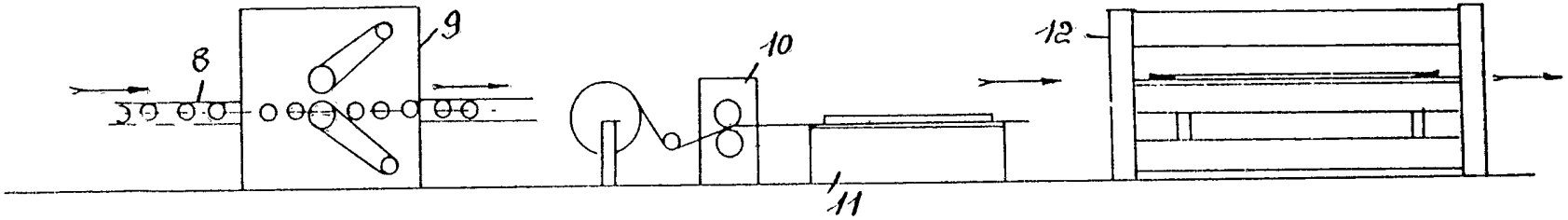


FIG.1B



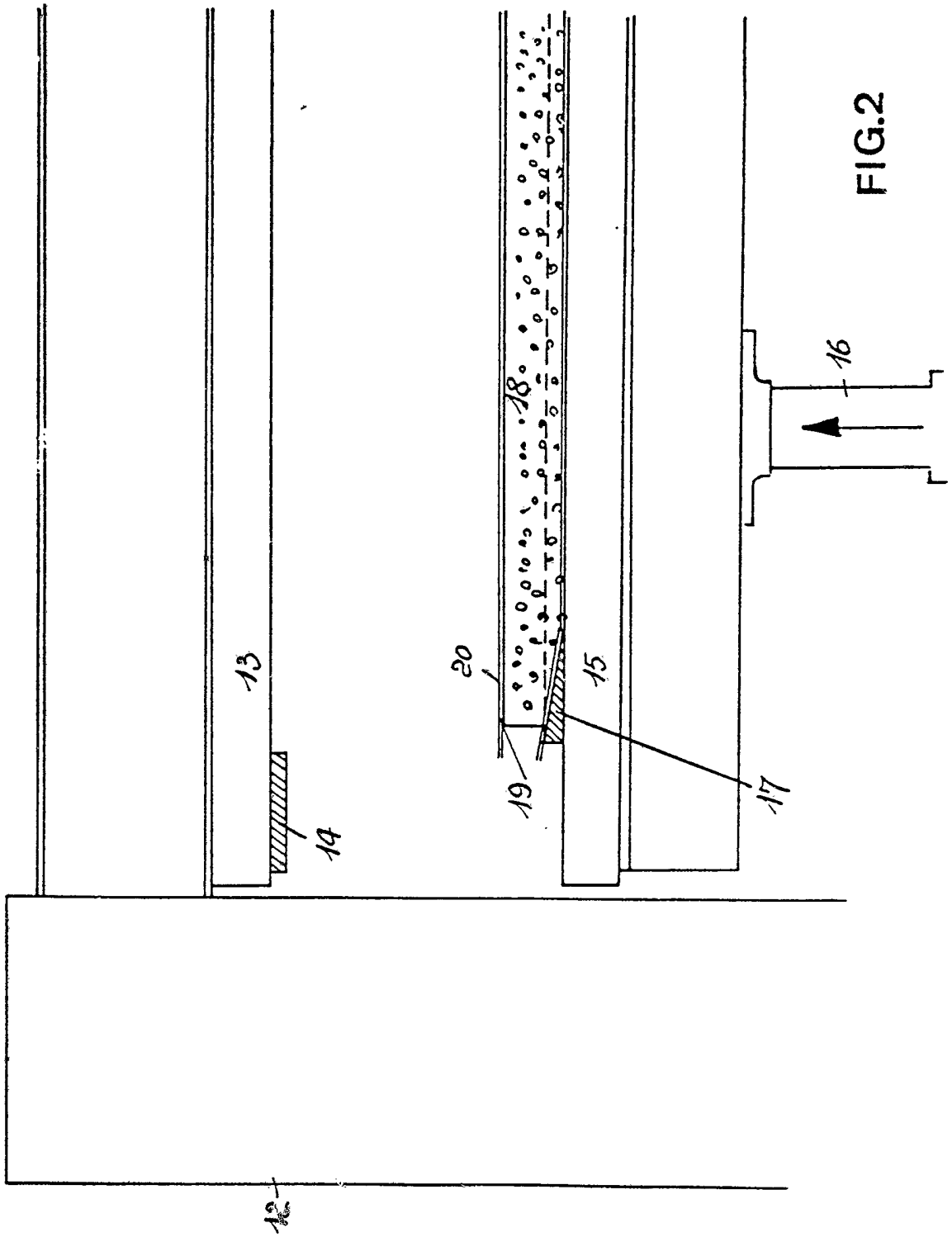


FIG.2

INTERNATIONAL SEARCH REPORT

International Application No PCT/BE 88/00013

I. CLASSIFICATION OF SUBJECT MATTER (if several classification symbols apply, indicate all) [6]

According to International Patent Classification (IPC) or to both National Classification and IPC

Int.Cl.[4]: D 21 J 1/00; D 21 J 1/20; D 21 J 3/12

II. FIELDS SEARCHED

Minimum Documentation Searched [7]

Classification System	Classification Symbols
Int.Cl[4]	D 21 J

Documentation Searched other than Minimum Documentation to the Extent that such Documents are Included in the Fields Searched [8]

III. DOCUMENTS CONSIDERED TO BE RELEVANT [9]

Category *	Citation of Document, [11] with indication, where appropriate, of the relevant passages [12]	Relevant to Claim No. [13]
A	US, A, 1570335 (COBB et al.) 19 January 1926, see the whole document	1,3
A	US, A, 1536163 (SUTHERLAND) 5 May 1925, see the whole document	1,3
A	EP, A, 0084917 (ASBL) 3 August 1983, see the whole document (cited in the application)	1,2
A	US, A, 4622190 (SCHULTZ) 11 November 1986, see the whole document	1,6
A	CH, A, 155800 (SIEMPELKAMP) 16 September 1932, see the whole document	1
A	US, A, 3748222 (WHEELER) 24 July 1973, see the whole document	6

* Special categories of cited documents: [10]

"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

Date of the Actual Completion of the International Search	Date of Mailing of this International Search Report
24 January 1989 (24.01.89)	15 February 1989 (15.02.89)
International Searching Authority	**Signature of Authorized Officer**
European Patent Office	

ANNEX TO THE INTERNATIONAL SEARCH REPORT ON INTERNATIONAL PATENT APPLICATION NO. BE 8800013 SA 22467

This annex lists the patent family members relating to the patent documents cited in the above-mentioned international search report. The members are as contained in the European Patent Office EDP file on 08/02/89
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Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US-A- 1570335			
US-A- 1536163			
EP-A- 0084917	03-08-83	LU-A- 83899	02-09-83
		DE-A- 3375032	04-02-88
US-A- 4622190	11-11-86	US-A- 4726881	23-02-88
CH-A- 155800			
US-A- 3748222	24-07-73		

RAPPORT DE RECHERCHE INTERNATIONALE

Demande internationale N° PCT/BE 88/00013

I. CLASSEMENT DE L'INVENTION (si plusieurs symboles de classification sont applicables, les indiquer tous) [7]

Selon la classification internationale des brevets (CIB) ou à la fois selon la classification nationale et la CIB

CIB[4]: D 21 J 1/00; D 21 J 1/20; D 21 J 3/12

II. DOMAINES SUR LESQUELS LA RECHERCHE A PORTÉ

Documentation minimale consultée [8]

Système de classification	Symboles de classification
CIB[4]	D 21 J

Documentation consultée autre que la documentation minimale dans la mesure où de tels documents font partie des domaines sur lesquels la recherche a porté [9]

III. DOCUMENTS CONSIDÉRÉS COMME PERTINENTS [10]

Catégorie *	Identification des documents cités [11] avec indication, si nécessaire, des passages pertinents [12]	N° des revendications visées [13]
A	US, A, 1570335 (COBB et al.) 19 janvier 1926, voir le document en entier	1,3
A	US, A, 1536163 (SUTHERLAND) 5 mai 1925, voir le document en entier	1,3
A	EP, A, 0084917 (ASBL) 3 août 1983, voir le document en entier (cité dans la demande)	1,2
A	US, A, 4622190 (SCHULTZ) 11 novembre 1986, voir le document en entier	1,6
A	CH, A, 155800 (SIEMPELKAMP) 16 septembre 1932, voir le document en entier	1
A	US, A, 3748222 (WHEELER) 24 juillet 1973, voir le document en entier	6

* Catégories spéciales de documents cités: [11]

« A » document définissant l'état général de la technique, non considéré comme particulièrement pertinent

« E » document antérieur, mais publié à la date de dépôt international ou après cette date

« L » document pouvant jeter un doute sur une revendication de priorité ou cité pour déterminer la date de publication d'une autre citation ou pour une raison spéciale (telle qu'indiquée)

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« P » document publié avant la date de dépôt international, mais postérieurement à la date de priorité revendiquée

« T » document ultérieur publié postérieurement à la date de dépôt international ou à la date de priorité et n appartenant pas à l'état de la technique pertinent, mais cité pour comprendre le principe ou la théorie constituant la base de l'invention

« X » document particulièrement pertinent l'invention revendiquée ne peut être considérée comme nouvelle ou comme impliquant une activité inventive

« Y » document particulièrement pertinent; l'invention revendiquée ne peut être considérée comme impliquant une activité inventive lorsque le document est associé à un ou plusieurs autres documents de même nature, cette combinaison étant évidente pour une personne du métier

« & » document qui fait partie de la même famille de brevets

IV. CERTIFICATION

Date à laquelle la recherche internationale a été effectivement achevée	Date d'expédition du présent rapport de recherche internationale
24 janvier 1989	15 FEB 1989
Administration chargée de la recherche internationale	**Signature du fonctionnaire autorisé**
OFFICE EUROPEEN DES BREVETS	P.C.G. VAN DER PUTTEN

Formulaire PCT/ISA/210 (deuxième feuille) (janvier 1985)

ANNEXE AU RAPPORT DE RECHERCHE INTERNATIONALE RELATIF A LA DEMANDE INTERNATIONALE NO.

BE 8800013
SA 22467

La présente annexe indique les membres de la famille de brevets relatifs aux documents brevets cités dans le rapport de recherche international visé ci-dessus.
Lesdits membres sont contenus au fichier informatique de l'Office européen des brevets à la date du 08/02/89
Les renseignements fournis sont donnés à titre indicatif et n'engagent pas la responsabilité de l'Office européen des brevets.

Document brevet cité au rapport de recherche	Date de publication	Membre(s) de la famille de brevet(s)	Date de publication
US-A- 1570335		Aucun	
US-A- 1536163		Aucun	
EP-A- 0084917	03-08-83	LU-A- 83899 DE-A- 3375032	02-09-83 04-02-88
US-A- 4622190	11-11-86	US-A- 4726881	23-02-88
CH-A- 155800		Aucun	
US-A- 3748222	24-07-73	Aucun	

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