

COMMONWEALTH OF AUSTRALIA  
Patents Act 1952

Declaration in Support of  
(a) A Convention Application  
~~(b) An Application~~  
for a Patent ~~or Patent of Addition~~

(a) Delete for Non-Convention Application.

(b) Delete for Convention Application.

(c) Insert Full Name of Applicant.

In support of the ~~Application~~/Convention Application made by

(c) LUC JANSSENS

for a patent/~~patent of addition~~ for an invention entitled:

(d) Insert Title of Invention.

(d) "PLANT FOR THE PREPARATION OF HIGH STRENGTH PLASTER"

(e) Insert Full Names of Declarant(s).

I/~~We~~ (e) LUC JANSSENS,

(f) Insert Address(es) of Declarant(s).

of (f) Berkenlaan 19, B-2610 WILRIJK-ANTWERPEN, Belgium

(g) Delete when Applicant is a Company.

do solemnly and sincerely declare as follows:--

1. (g) I am/~~we are~~ the applicant(s) for the patent/~~patent of addition~~  
~~or~~

(h) Delete when Applicant is an Individual. Fill in Name of Applicant if a Company.

(h) I am/~~we are~~ authorised by--

~~the applicant for the patent/patent of addition to make this declaration on its behalf.~~

(i) For Non-Convention Application delete. For Convention Application, fill in details of basic application.

2. (i) The basic application(s) as defined by Section 141 of the Act was/~~were~~ made in Luxembourg on the 4th day of March 1987 by myself, Luc Janssens.

(j) Delete for Non-Convention Application by Assignee of Inventor and for Convention Application.

3. (j) I am/~~we are~~ the actual inventor(s) of the invention  
~~or~~

(k) Delete for Non-Convention Application by Inventor and for Convention Application by Assignee.

(k) I am/~~we are~~ the actual inventor(s) of the invention referred to in the basic application.  
~~or~~

(l) Delete for Application by Inventor. For Application by Assignee, insert name, address and occupation of Inventor.

(l) ~~is/are the actual inventor(s) of the invention and the facts upon which I am/~~we are~~ the applicant is entitled to make the application as follows.~~

(m) Insert details of Assignment, etc. Date of Assignment only is insufficient.

(m)

(4) Delete for Non-Convention Application.


4. The basic application(s) referred to in paragraph 2 of this Declaration was/~~were~~ the first application(s) made in a Convention country in respect of the invention the subject of the application.

(n) Insert place and date of signature.

(n) Declared at Wilrijk-Antwerpen this 26th day of October, 1988.

SIGN

X



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**(12) PATENT ABRIDGMENT (11) Document No. AU-B-15468/88**  
**(19) AUSTRALIAN PATENT OFFICE (10) Acceptance No. 605582**

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(54) Title  
INSTALLATION FOR THE PREPARATION OF HIGH-STRENGTH PLASTER

International Patent Classification(s)  
(51)<sup>4</sup> C04B 011/032

(21) Application No. : 15468/88 (22) Application Date : 02.03.88

(87) WIPO Number : WO88/06573

(30) Priority Data

(31) Number	(32) Date	(33) Country
86800	04.03.87	LU LUXEMBOURG

(43) Publication Date : 26.09.88

(44) Publication Date of Accepted Application : 17.01.91

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(56) Prior Art Documents  
GB 811246  
US 1568791

(57) Claim

1. Plant for the preparation of high-strength plaster from natural calcium sulphate (gypsum) or from synthetic calcium sulphate, said plant including: at least one endless chain conveyor equipped with tiltable paddles, which is diverted on return pinions so as to form in a closed chamber at least one upper strand and one lower strand; a feed hopper for said starting material, arranged above said first upper strand; and a heating device whose hot gases are propelled into chambers, each arranged between an upper strand and a lower strand of said closed chamber.

14. Process for the treatment of a starting material consisting of calcium sulphate in order to obtain a plaster exhibiting better characteristics using a plant according to any one of claims 1 to 12, wherein:

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(10) 605582

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said starting material is crushed into powder form and is moistened at ambient temperature until it has a water content of the order of from 15 to 30%, expressed in relation to its original weight; said material thus moistened is introduced into said plant in a processing chamber which is itself superheated to a temperature of the order of from 500 to 600 °C so that, in this processing chamber, a large quantity of steam is produced by boiling the water present in the powdered material with, simultaneously with the action of this steam, a movement of entrainment of the material by means of paddles in said chamber; and this action in the boiling state is continued after a first initiation in said processing chamber by a subsequent continuous stirring of said powdered material, while the temperature decreases progressively.

AU-AI-15468/88

PCT

ORGANISATION MONDIALE DE PROPRIÉTÉ INTELLECTUELLE  
Bureau international

605582



DEMANDE INTERNATIONALE PUBLIÉE EN VERTU DU TRAITE DE COOPERATION EN MATIÈRE DE BREVETS (PCT)

<p>(51) Classification internationale des brevets<sup>4</sup> : <b>C04B 11/032</b></p>	<p><b>A1</b></p>	<p>(11) Numéro de publication internationale: <b>WO 88/ 06573</b> (43) Date de publication internationale: 7 septembre 1988 (07.09.88)</p>
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(21) Numéro de la demande internationale: PCT/BE88/00007  
(22) Date de dépôt international: 2 mars 1988 (02.03.88)  
(31) Numéro de la demande prioritaire: 86800  
(32) Date de priorité: 4 mars 1987 (04.03.87)  
(33) Pays de priorité: LU

(81) Etats désignés: AT (brevet européen), AU, BE (brevet européen), BJ (brevet OAPI), BR, CF (brevet OAPI), CG (brevet OAPI), CH (brevet européen), CM (brevet OAPI), DE (brevet européen), FR (brevet européen), GA (brevet OAPI), GB (brevet européen), IT (brevet européen), JP, KR, LU (brevet européen), ML (brevet OAPI), MR (brevet OAPI), NL (brevet européen), SD, SE (brevet européen), SN (brevet OAPI), TD (brevet OAPI), TG (brevet OAPI), US.

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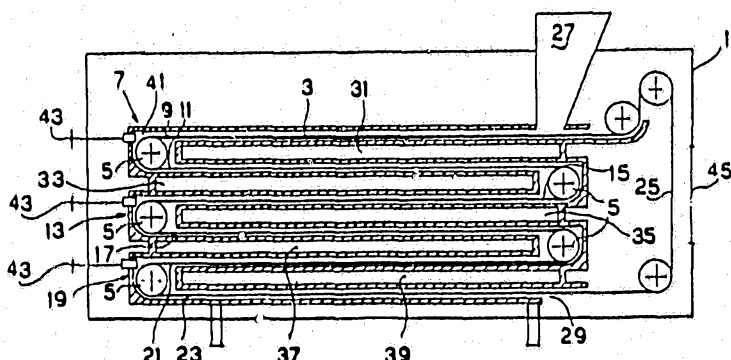
Publiée  
*Avec rapport de recherche internationale.  
Avant l'expiration du délai prévu pour la modification des revendications, sera republiée si de telles modifications sont reçues.*

A.O.J.P. 27 OCT 1988

This document contains the amendments made under Section 49 and is correct for printing

AUSTRALIAN  
26 SEP 1988  
PATENT OFFICE

(54) Title: INSTALLATION FOR THE PREPARATION OF HIGH-STRENGTH PLASTER  
(54) Titre: INSTALLATION POUR LA PREPARATION DE PLÂTRE DE HAUTE RESISTANCE



(57) Abstract  
An installation for the preparation of high-strength plaster from synthetic or natural calcium sulphate (gypsum), characterized in that it comprises at least one endless chain conveyor (13) fitted with tipping pallets (53) which is diverted on return pinions (5) to form at least one upper side (9, 15, 21) and one lower side (11, 17, 23), a feed hopper (27) containing the raw material arranged above the first upper side (9) and a heating device in which the hot gases are propelled into chambers (31 to 39) each of which is arranged between an upper side and a lower side.

(57) Abrégé  
Installation pour la préparation de plâtre à haute résistance à partir de sulfate de calcium naturel (gypse) ou de synthétique, caractérisée en ce qu'elle comporte au moins un transporteur à chaînes sans fin (13) équipé de palettes basculables (53) qui est dévié sur des pignons de renvoi (5) de manière à former au moins un brin supérieur (9, 15, 21) et un brin inférieur (11, 17, 23), une trémie d'alimentation (27) en matière de départ disposée au-dessus du premier brin supérieur (9) et un dispositif de chauffage dont les gaz chauds sont propulsés dans des chambres (31 à 39) disposées entre chaque fois un brin supérieur et un brin inférieur.

Plant for the preparation of high strength plaster.

The present invention relates to a plant for the preparation of high strength plaster from natural calcium sulphate (gypsum) or from synthetic calcium sulphate (sulphogypsum, phosphogypsum and other synthesis by-products).

At the present time it is known to prepare high strength plasters (referred to as "α plasters", owing to the fact that they consist essentially of semihydrates or anhydrites of the α variety), which, once set, exhibit much higher mechanical characteristics than those of common plasters (referred to as "β plasters", since they consist essentially of the β variety). Thus, the compressive strength of α plasters can vary between 300 and 600 bars and their flexural strength between 80 and 160 bars, whereas, in the case of β plasters, these strengths vary between 50 and 100 bars and between 10 and 20 bars respectively.

Document FR-A-84/17,162 discloses a plant for the production of α plaster, in which trays are mounted on a central pivot and the material, that is to say calcium sulphate in the form of powder, is moved by a grid to fall from tray to tray through an opening made in each tray. As a result of this, the material subjected to the conventional necessary heat treatments is subjected to movement; this improves the process yield and/or the quality of the product obtained. However, this plant exhibits the disadvantage which consists in that it is difficult to carry out the heat treatments therein at the desired temperatures. Furthermore, the plant is not fully satisfactory insofar as the profitability of the process and the quality of the product obtained are concerned.

The objective of the present invention consists in providing a plant for the manufacture of high strength plaster, which is of simple construction and modest in bulk, without comprising the disadvantages of the known plant. Another objective of the present invention consists in providing mobile units for the manufacture of high



The present invention seeks to provide a plant for the manufacture of high strength plaster, which is of simple construction and modest in bulk, without exhibiting the disadvantages of the known plant. The present invention also seeks to provide mobile units for the manufacture of high strength plaster.

The present invention also seeks to provide a plant which permits the manufacture of a high strength plaster such as  $\alpha$  plaster according to a continuous process, from natural gypsum or from synthesis by-products or residues.

According to a first aspect of the present invention, therefore, there is provided a plant for the preparation of high-strength plaster from natural calcium sulphate (gypsum) or from synthetic calcium sulphate, said plant including: at least one endless chain conveyor equipped with tiltable paddles, which is diverted on return pinions so as to form in a closed chamber at least one upper strand and one lower strand; a feed hopper for said starting material, arranged above said first upper strand; and a heating device whose hot gases are propelled into chambers, each arranged between an upper strand and a lower strand of said closed chamber.

In accordance with a further aspect of the present invention there is provided a process for the treatment of a starting material consisting of calcium sulphate in order to obtain a plaster exhibiting better characteristics, using a plant of the type referred to in the preceding paragraph, wherein:

said starting material is crushed into powder form and is moistened at ambient temperature until it has a water content of the order of from 15 to 30%, expressed in relation to its original weight; said material thus moistened is introduced into said plant in a processing chamber which is itself superheated to a temperature of



the order of from 500 to 600 °C so that, in this processing chamber, a large quantity of steam is produced by boiling the water present in the powdered material with, simultaneously with the action of this steam, a movement of entrainment of the material by means of paddles in said chamber; and this action in the boiling state is continued after a first initiation in said processing chamber by a subsequent continuous stirring of said powdered material, while the temperature decreases progressively.

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The number of returns of the chain conveyor depends on the length of the linear path and on the required processing capacity.

According to a first preferred embodiment, the plant in accordance with the invention includes three return stages of the chain conveyor, that is to say six upper and lower strands. It may, however, also include still more of these, depending on the existing requirements.

In accordance with another preferred embodiment the plant further includes, downstream of the endless chain conveyor, at least one stage comprising at least one channel equipped with a conveying screw, with the hot gases circulating in the said channels.

20

The plant according to the present invention preferably comprises several stages of channels and each stage comprises several essentially parallel channels.

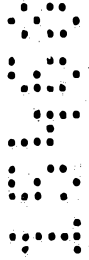
In accordance with the present invention the tiltable paddles preferably are kept in a substantially horizontal position along the path of an upper or lower strand of the chain conveyor and tilt at the end of the path in order to discharge the material being conveyed onto the paddles of the

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following lower or upper strand respectively in the channel(s) mounted downstream or, if desired, through the discharge opening, at the outlet of the plant. Consequently, the material is turned over and stirred

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at least once during its processing; this allows the homogeneity of the product obtained to be improved.

5 A conveying screw is arranged so as to be capable of rotating in a channel and conveying and agitating the material therein before spilling it into a lower stage of channel(s) or through a discharge opening.

10 Insofar as the plant comprises a number of stages of channels, provision is made for the material to move in one direction in a first stage and in the opposite direction in the following stage. To do this, provision may be made for the screw(s) of the first stage to rotate in one direction and for the screw(s) of the following stage to rotate in the opposite direction or, preferably, for all the screws to rotate in the same direction, the screw of 15 the first stage comprising a screw pitch inverse to that of the second stage.

20 In an alternative form, provision is made, in one and the same stage, for the material to flow from one channel to another in order to be conveyed with a reciprocating motion, before being discharged into the following stage or through the discharge opening.

25 According to a particularly preferred embodiment of the invention, the conveying screw comprises a core on which there extends a helical projection which supports a raised helical part which is essentially perpendicular to the axis so that it comprises a cranked outline. An essential result of this is that the material undergoes stirring; in fact, in the region close to the axis, the material is entrained and compressed whereas, in the peripheral region, it can relax and even undergo a certain 30 return motion in addition, that is to say inversely to the conveying direction. This stirring of the material facilitates and improves the action of the steam.

35 Advantageously, the chain conveyor or the screws move in a closed chamber comprising an entry opening for the chain conveyor and for the starting material, one or more stages of channels, and an exit opening. The said closed chamber is advantageously equipped with over-pressure valves which permit the pressure inside the said



chamber to be regulated.

Preferably, in order to reduce the tension in the chain conveyor, at least a part of the return pinions is equipped with a driving means such as an external pinion subjected to the action of a driving torque.

The plant according to the present invention is advantageously mounted in a casing comprising a window which makes it possible to check the state of the paddles which are recycled, for example.

In comparison with the abovementioned state of the art, the advantage of the plant in accordance with the present invention consists in that there is no scraping of the material and that the material is better stirred and made more homogeneous by the overturning of the paddles and the eddy motions due to the screws in the channels.

Other details will appear more clearly on reading the description of a preferred embodiment given in support of the attached figures, in which:

- Figure 1 is a diagrammatic side view of the plant in accordance with the present invention;
- Figure 2 is a diagrammatic view on a larger scale of a return pinion of the chain conveyor;
- Figure 3 is a diagrammatic side view of the plant according to an alternative form;
- Figures 4A and 4B show a front view and a side view, respectively, of a part of a screw in accordance with the invention; and
- Figure 5 is a perspective view of a part of a screw in accordance with the invention.

With reference to the figures, identical reference symbols refer to identical or similar components.

Figure 1 shows a plant for the manufacture of  $\alpha$  plaster from gypsum or from synthetic calcium sulphate, comprising, in a casing 1, an endless chain conveyor 3 equipped with tiltable paddles, which is diverted over return pinions 5 so as to form three stages 7, 13, 19, each comprising an upper strand 9, 15, 2 and a lower strand 11, 17, 23, before being recycled at 25. The



plant is equipped with a feed hopper 27 and a discharge opening 29. The plant also comprises a heating device (not shown) such as a gas burner whose hot fumes are propelled into the chambers 31 to 39, each arranged between an upper strand and a lower strand. Advantageously, the fumes travel from the bottom upwards, while the material is conveyed from the top downwards.

It is quite obvious that the plant shown in Figure 1 is given by way of an example without any limitation being implied and that a plant in accordance with the present invention may, depending on requirements, comprise more than three stages, for example 10 stages.

According to the present invention, the chain conveyor travels in a continuous chamber 41 which can be equipped with valves 43 for pressure control.

Advantageously, casing 1 is provided with a window 45 which makes it possible to check the state of the chain conveyor and of the paddles which may be conveyed, especially along the recycle path 25.

Figure 2 shows a return pinion 5 and the arrangement of the chain conveyor in greater detail. The said chain conveyor is made up of two chains with parallel cheeks between which there are housed paddles 53 which are tiltable on a tilting pivot 55 fastened integrally to two chains with cheeks 51. Along the path of an upper or lower strand, the said paddles 53 are kept in an essentially horizontal position by virtue of guides consisting of the lower walls 57, 59 of the continuous chamber 41. At the end of the path, the paddles 53 are released and can tilt the material onto the strand situated below them.

The starting material supplied by the hopper is thus turned over several times while being processed.

The tilting movement of the paddles 53 is advantageously guided by end stops 61 and 63 which prevent the said paddles from hitting the chamber walls too abruptly, resulting in premature wear of the plant.

The continuous chamber 41 is advantageously equipped with scraper blades 65 for levelling the material, especially downstream of a turnover, with the result that



the material is distributed on the paddles and forms virtually no agglomerates.

According to a preferred embodiment, the return pinions 5 are provided with a driving means (not shown) such as, for example, an additional pinion mounted outside the chamber 41 on the same shaft as that of the pinion 5, and to which a driving torque is applied. It is quite obvious that the passage of the said shaft through the side walls of the continuous chamber 41 is made leak-proof.

According to an alternative form of embodiment (Figure 3), the plant of Figure 1 is followed by several stages (77, 79), each comprising several channels in which conveying screws 80, such as shown in Figures 4 and 5, are rotating. In this case, the material spilling through the discharge opening 29 falls into the channels and is carried away by the conveying screws 80.

The conveying screws are made up of a number of components 80 assembled in a manner known per se. At the end away from the feed, the material is discharged into a lower channel 79 which conveys the material in the opposite direction to spill it into an additional lower stage or through a discharge opening 29' for the processed material.

Advantageously, all the screws rotate in the same direction, the screw of the first stage 77 comprising a pitch which is inverse to that of the following stage 79.

The screw comprises a core 81 on which there extends a helical projection 83 supporting a raised helical part 85 which is essentially perpendicular to the axis 87. This part is raised with the result that it has a shoulder 88. The effect of this is that, in the region close to the shaft, the material is entrained and consequently undergoes a compression and that, in the peripheral region, it undergoes a certain relaxation which permits it to fall again, while intensive stirring is continued. As a result of this the hot gases circulating in the channels come into contact with all the material and a homogeneous material of high quality is obtained.



In a complementary form, the invention relates to a process for the treatment of the starting material in order to obtain a plaster exhibiting better characteristics. This process is made possible by resorting to the plant described above.

According to this process, the starting material is crushed into powder form and is moistened at ambient temperature until it has a water content of the order of 15 to 30% of water, expressed in relation to its original weight, and preferably of the order of 15 to 20%.

The material thus moistened is introduced into the plant in a processing chamber which is itself superheated to a temperature of the order of 500 to 600°C.

In this processing chamber, a large quantity of steam is produced by boiling the water present in the powdered material. Simultaneously with the action of this steam, a movement of entrainment of the material by means of paddles is produced in the said chamber.

This action in the boiling state is continued after a first initiation in the said processing chamber by a subsequent continuous stirring of the powdered material (by means of the stirring screws), while the temperature decreases progressively.

As the material continues its progress through the said plant, the process is repeated and continues. As a consequence of the hydration of the starting material, coupled with the entraining and stirring action, the material is finally progressively subjected to the action of dry steam.

Lastly, the material collected at the outlet of the plant is a virtually dry powder devoid of steam, but whose physical properties have been appreciably modified.

This is made possible in particular by the special shape of the screw which has been described, which permits boiling water to form steam in situ and within the bulk of the material. The special shape of the screw allows the material processed to be subjected successively to a pushing and entraining action and to a decompression during its travel and this, in addition to the stirring,



allows the steam to act directly within the material.

The steam, which can thus escape better, permits the particles of material to be processed more intimately as it passes through.

5           In the case of a screw whose pitch was, for example, 50 mm and the length 3 metres, the material would thus be subjected 60 times in practice to an action of this type, consisting of a pushing/entrainment followed by a decompression. In the case where such an action is  
10 repeated again on each of the fifteen stages of a plant, particularly remarkable results are obtained. The principle, therefore, consists in processing small volumes (and consequently reduced weights) of material intimately with steam in an efficacious and thorough manner, this  
15 being done repeatedly, and this produces a very superior efficiency.

In this respect, the process of the present invention is clearly distinguished from the techniques known hitherto.

20           The present invention is obviously not limited solely to the description but the protection extends to the scope defined by the claims.



The claims defining the invention are as follows:

1. Plant for the preparation of high-strength plaster from natural calcium sulphate (gypsum) or from synthetic calcium sulphate, said plant  
5 including; at least one endless chain conveyor equipped with tiltable paddles, which is diverted on return pinions so as to form in a closed chamber at least one upper strand and one lower strand; a feed hopper for said starting material,  
10 arranged above said first upper strand; and a heating device whose hot gases are propelled into chambers, each arranged between an upper strand and a lower strand of said closed chamber.

2. Plant according to claim 1, including three return stages of said chain conveyor.

3. Plant according to claim 1 or claim 2, wherein said tiltable paddles are kept in a substantially horizontal position along the path of an upper or  
15 lower strand of said chain conveyor and tilt at the end of said path in order to discharge the material being conveyed onto said paddles of the following lower or upper strand respectively, or else through a discharge opening at the outlet  
20 of said plant.

4. Plant according to any one of the preceding claims, wherein said  
25 chain conveyor is made up of two chains with parallel cheeks between which there are housed paddles which are tiltable on a tilting pivot fastened integrally to two chains with cheeks.

5. Plant according to any one of the preceding claims, wherein said paddles are kept in a horizontal position by guides consisting of the lower walls  
25 of the chamber and wherein the tilting movement of said paddles is guided by end stops.



6. Plant according to any one of the preceding claims, equipped with scraper blades for levelling the material on said chain conveyor.

7. Plant according to any one of the preceding claims further including, downstream of said chain conveyor, at least one stage including at least one channel equipped with a conveying screw, with the hot gases circulating in said channels.

8. Plant according to any one of the preceding claims, wherein screw(s) of a first stage of channels rotates (rotate) in one direction and screw(s) of the following stage rotates (rotate) in the opposite direction.

9. Plant according to any one of claims 1 to 7, wherein screw(s) of a first stage of channel(s) has (have) a screw pitch inverse to that of the screw(s) of a following stage, the screws rotating in the same direction of rotation.

10. Plant according to any one of claims 7 to 9, wherein said at least one conveying screw includes a core on which there extends a helical projection which supports a raised helical part which is substantially perpendicular to the axis thereof, with the result that it has a cranked outline.

11. Plant according to any one of the preceding claims, wherein said chain conveyor and said screws move in a closed chamber including an entry opening for said chain conveyor and for the material, and an exit opening and wherein said closed chamber is equipped with overpressure valves.

12. Plant according to claim 11, wherein said screws move in said closed chamber including an entry opening for said chain conveyor, for the material and for said screws.

13. Plant according to any one of the preceding claims, mounted in a casing including a window which makes it possible to check the state of said paddles which are recycled.



14. Process for the treatment of a starting material consisting of calcium sulphate in order to obtain a plaster exhibiting better characteristics using a plant according to any one of claims 1 to 12, wherein:

5 said starting material is crushed into powder form and is moistened at ambient temperature until it has a water content of the order of from 15 to 30%, expressed in relation to its original weight;

said material thus moistened is introduced into said plant in a processing chamber which is itself superheated to a temperature of the order of from 500 to 600°C so that, in this processing chamber, a large quantity of steam is produced by boiling the water present in the powdered material with, simultaneously with the action of this steam, a movement of entrainment of the material by means of paddles in said chamber; and this action in the boiling state is continued after a first initiation in said processing chamber by a subsequent continuous stirring of said powdered material, while the temperature decreases progressively.

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15  
20 15. The process according to claim 14, wherein said water content of said crushed starting material is of the order of from 15 to 20%, expressed in relation to its original weight.

16. Process according to claim 14 or claim 15, wherein said subsequent stirring is coupled with a pushing and entraining action and with a decompression of the material to be treated which, in addition to the stirring, allows the steam to act directly.

25 17. Process according to claim 16, wherein a large number of series of pushing/entrainment and decompression actions are performed and wherein said material is progressively subjected to the action of dry steam and is finally



collected at the outlet of said plant in the form of a dry powder.

18. Plant for the preparation of high-strength plaster from natural calcium sulphate (gypsum) or from synthetic calcium sulphate, substantially as described herein with reference to the accompanying drawings.

19. Process for treatment of a starting material, as claimed in claim 14, substantially as described herein with reference to the accompanying drawings.


20. A high strength natural plaster, when produced by the plant according to claim 1 or the process according to claim 14.

DATED the 18th day of October, 1990

LUC JANSSENS

by his Patent Attorneys

CALLINAN LAWRIE



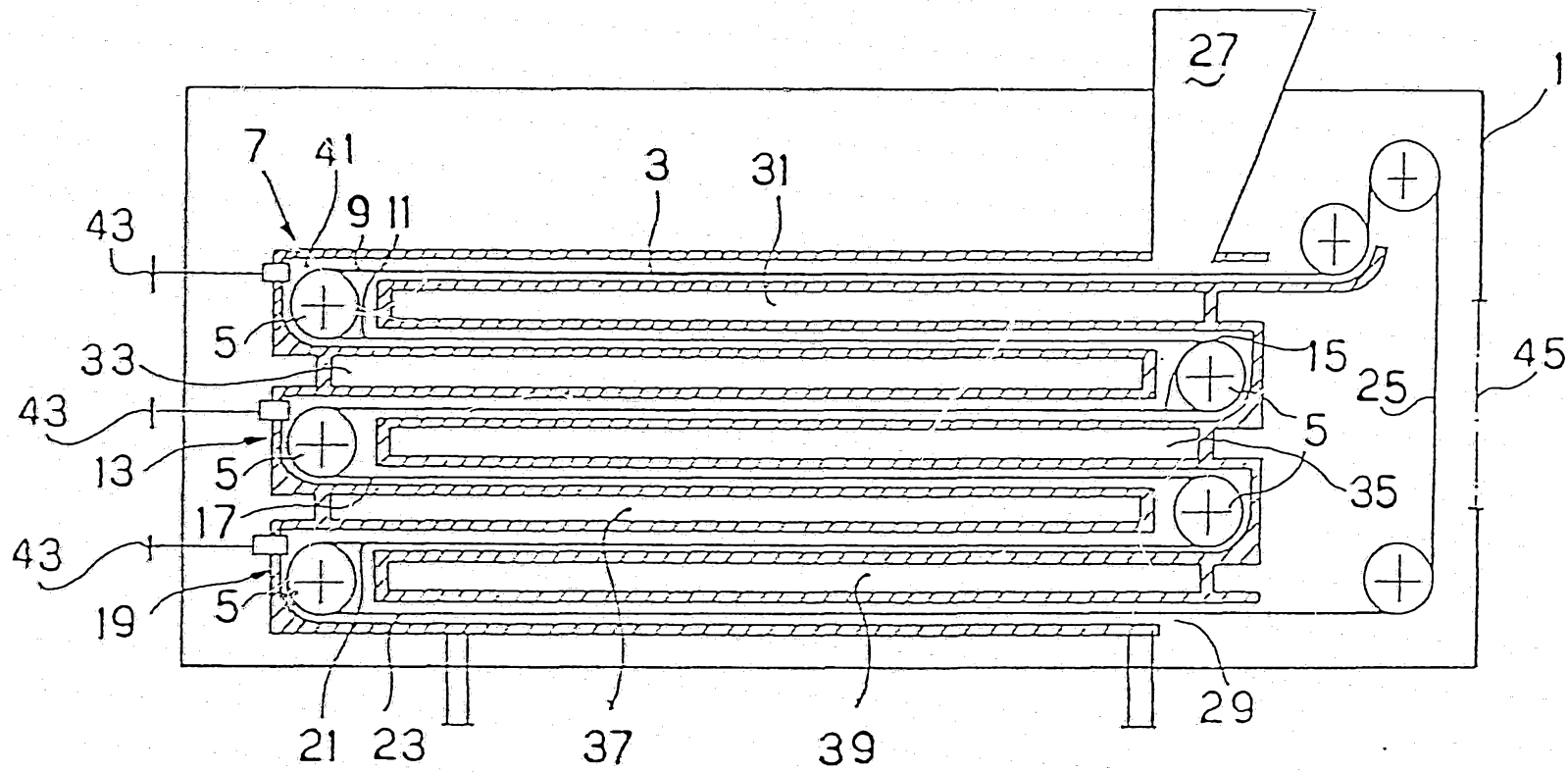


FIG. 1

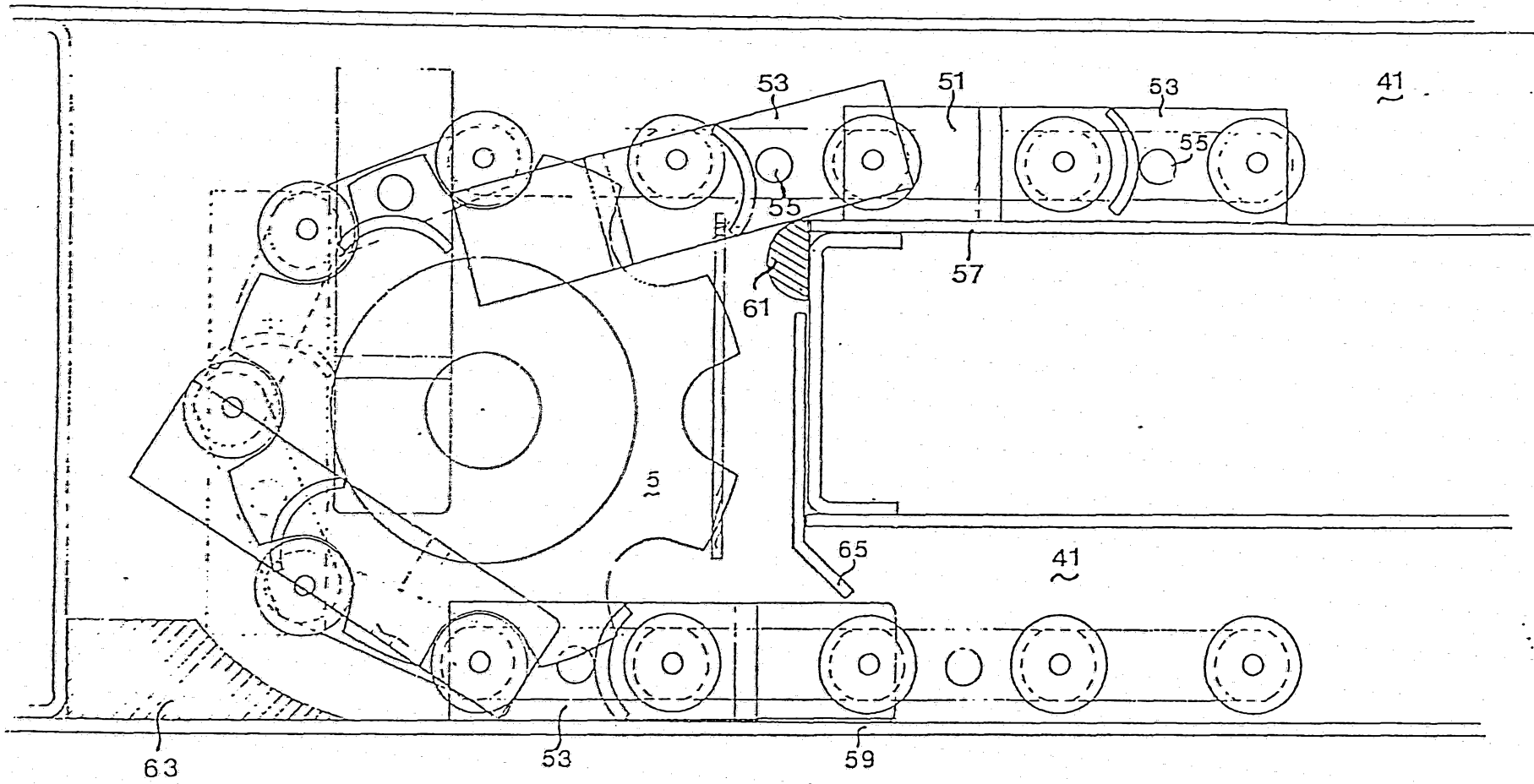


FIG. 2

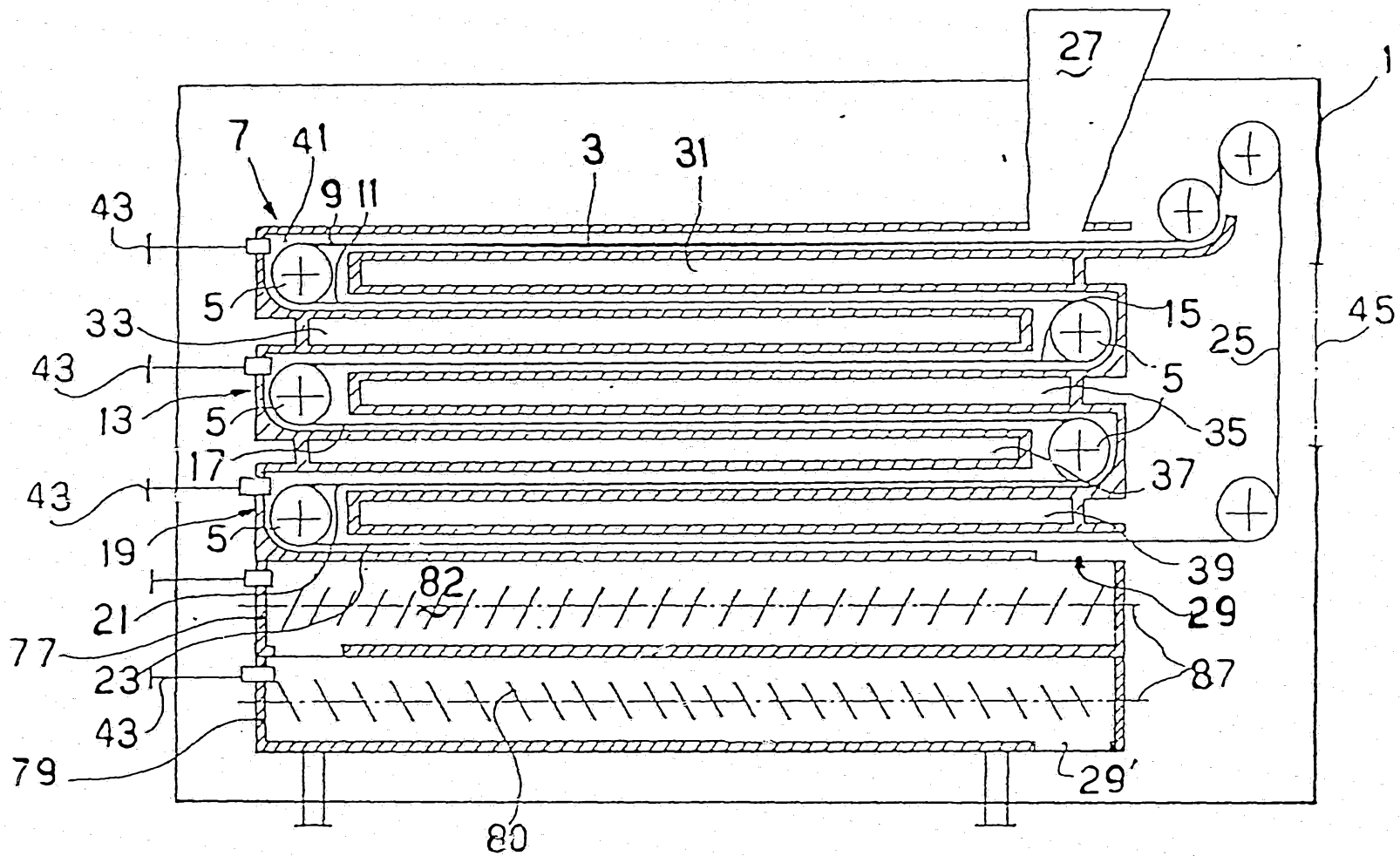


FIG. 3

FIG. 5

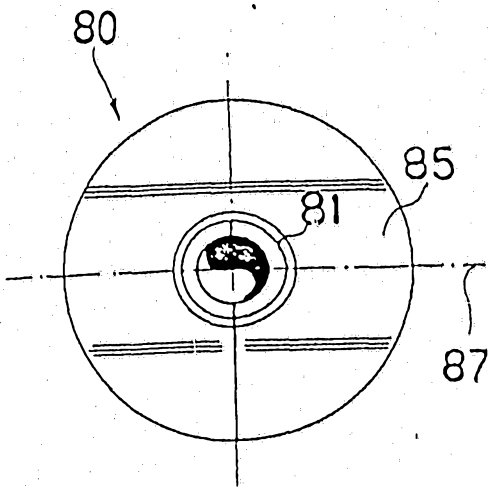
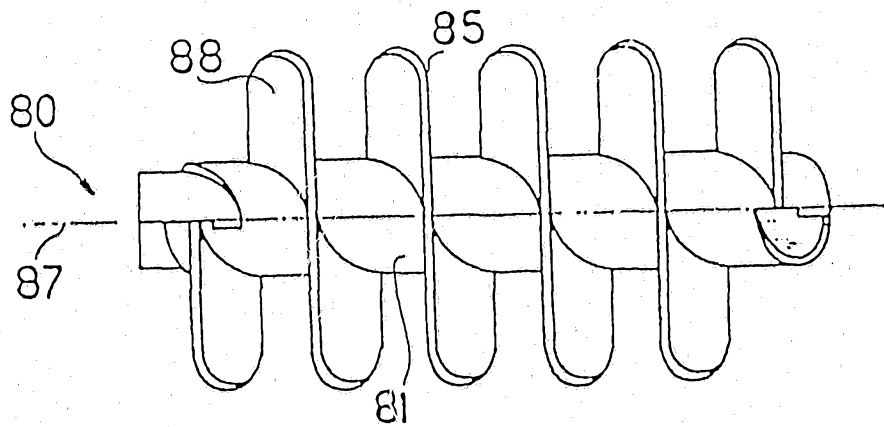


FIG. 4A

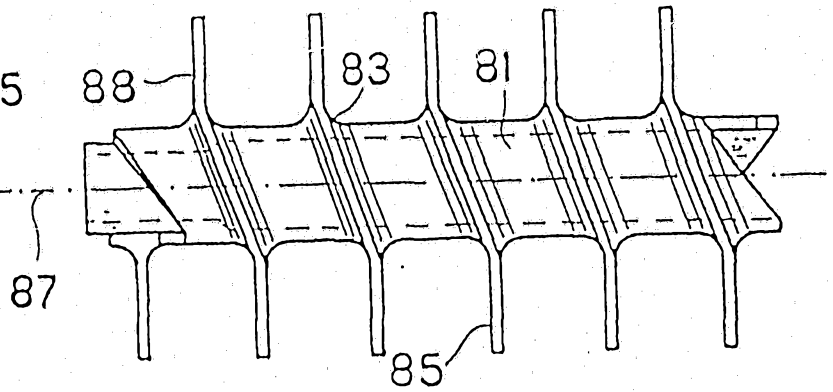


FIG. 4B

# INTERNATIONAL SEARCH REPORT

PCT/BE 88/00007

International Application No

<b>I. CLASSIFICATION OF SUBJECT MATTER</b> (If several classification symbols apply, indicate all) <sup>6</sup>		
According to International Patent Classification (IPC) or to both National Classification and IPC Int Cl <sup>7</sup> : C 04 B 11/032		
<b>II. FIELDS SEARCHED</b>		
Minimum Documentation Searched <sup>7</sup>		
Classification System	Classification Symbols	
Int Cl <sup>4</sup>	C 04 B; F 26 B; B 65 G	
Documentation Searched other than Minimum Documentation to the extent that such Documents are included in the Fields Searched <sup>8</sup>		
<b>III. DOCUMENTS CONSIDERED TO BE RELEVANT <sup>9</sup></b>		
Category <sup>9</sup>	Citation of Document, <sup>11</sup> with indication, where appropriate, of the relevant passages <sup>12</sup>	Relevant to Claim No. <sup>13</sup>
Y	GB, A, 811246 (GYPSUM) 2 April 1959 see page 7, lines 49-63; figures --	1-6, 11, 12
Y	FR, A, 431234 (DESAULLES) 6 November 1911 see abstract; figures --	1-6, 11, 12
A	DE, B, 1072867 (BESTA) 7 January 1960 see figures	7-10
A	EP, A, 0074887 (DÜSSEL) 23 March 1983 see abstract --	13-15
A	FR, A, 2009799 (SAAR-GIPSWERKE) 6 February 1970 --	
A	US, A, 1568791 (AIKEN) 5 January 1926 --	
A	FR, A, 491174 (HOFMANN) 24 May 1919 --	
A	FR, A, 595664 (FOUQUET) 7 October 1925 --	
<p><sup>9</sup> Special categories of cited documents: <sup>10</sup></p> <p>"A" document defining the general state of the art which is not considered to be of particular relevance</p> <p>"E" earlier document but published on or after the international filing date</p> <p>"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)</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 later than the priority date claimed</p> <p>"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</p> <p>"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step</p> <p>"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.</p> <p>"&amp;" document member of the same patent family</p>		
<b>IV. CERTIFICATION</b>		
Date of the Actual Completion of the International Search	Date of Mailing of this International Search Report	
7 July 1988 (07-07-88)	22 July 1988 (22-07-88)	
International Searching Authority	Signature of Authorized Officer	
European Patent Office		

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

Category *	Citation of Document, with indication, where appropriate, of the relevant passages	Relevant to Claim No
A	GB, A, 708409 (COLOMBO) 5 May 1954	
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A	FR, A, 944968 (PISCAGLIA) 21 April 1949	
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ANNEX TO THE INTERNATIONAL SEARCH REPORT  
ON INTERNATIONAL PATENT APPLICATION NO.

BE 8800007  
SA 21542

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 12/07/88. The European Patent Office is in no way liable for these particulars which are merely given for the purpose of information.

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
GB-A- 811246		Aucun	
FR-A- 431234		Aucun	
DE-B- 1072867		Aucun	
EP-A- 0074887	23-03-83	FR-A- 2512438 AU-A- 8775082 JP-A- 58060647 OA-A- 7204	11-03-83 10-03-83 11-04-83 30-04-84
FR-A- 2009799	06-02-70	DE-A- 1771502 GB-A- 1260729 US-A- 3623234 DE-A, C 1758766	01-04-71 19-01-72 30-11-71 25-03-71
US-A- 1568791		Aucun	
FR-A- 491174		Aucun	
FR-A- 595664		Aucun	
GB-A- 708409		Aucun	
FR-A- 944968		Aucun	

## RAPPORT DE RECHERCHE INTERNATIONALE

Demande internationale N° **PCT/BE 88/00007**

<b>I. CLASSEMENT DE L'INVENTION</b> (si plusieurs symboles de classification sont applicables, les indiquer tous) <sup>7</sup>		
Selon la classification internationale des brevets (CIB) ou à la fois selon la classification nationale et la CIB		
CIB <sup>4</sup> : <b>C 04 B 11/032</b>		
<b>II. DOMAINES SUR LESQUELS LA RECHERCHE A PORTE</b>		
Documentation minimale consultée <sup>8</sup>		
Système de classification	Symboles de classification	
CIB <sup>4</sup>	<b>C 04 B; F 26 B; B 65 G</b>	
Documentation consultée autre que la documentation minimale dans la mesure où de tels documents font partie des domaines sur lesquels la recherche a porté <sup>9</sup>		
<b>III. DOCUMENTS CONSIDERES COMME PERTINENTS</b> <sup>10</sup>		
Catégorie <sup>*</sup>	Identification des documents cités, <sup>11</sup> avec indication, si nécessaire, des passages pertinents <sup>12</sup>	N° des revendications visées <sup>13</sup>
Y	GB, A, 811246 (GYPSUM) 2 avril 1959 voir page 7, lignes 49-63; figures --	1-6, 11, 12
Y	FR, A, 431234 (DESAULLES) 6 novembre 1911 voir résumé; figures --	1-6, 11, 12
A	DE, B, 1072867 (BESTA) 7 janvier 1960 voir figures --	7-10
A	EP, A, 0074887 (DUSSEL) 23 mars 1983 voir résumé --	13-15
A	FR, A, 2009799 (SAAR-GIPSWERKE) 6 février 1970 --	
A	US, A, 1568791 (AIKEN) 5 janvier 1926 --	
A	FR, A, 491174 (HOFMANN) 24 mai 1919 --	
A	FR, A, 595664 (FOUQUET) 7 octobre 1925 --	
	./.	
<p><sup>*</sup> Catégories spéciales de documents cités: <sup>11</sup></p> <p>« A » document définissant l'état général de la technique, non considéré comme particulièrement pertinent</p> <p>« E » document antérieur, mais publié à la date de dépôt international ou après cette date</p> <p>« 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)</p> <p>« O » document se référant à une divulgation orale, à un usage, à une exposition ou à d'autres moyens</p> <p>« P » document publié avant la date de dépôt international, mais postérieurement à la date de priorité revendiquée</p> <p>« 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</p> <p>« X » document particulièrement pertinent: l'invention revendiquée ne peut être considérée comme nouvelle ou comme impliquant une activité inventive</p> <p>« 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.</p> <p>« &amp; » document qui fait partie de la même famille de brevets</p>		
<b>IV. CERTIFICATION</b>		
Date à laquelle la recherche internationale a été effectivement achevée	Date d'expédition du présent rapport de recherche internationale	
<b>7 juillet 1988</b>	<b>22. 07. 88</b>	
Administration chargée de la recherche internationale	Signature du fonctionnaire autorisé	
<b>OFFICE EUROPEEN DES BREVETS</b>	<b>P.C.G. VAN DER PUTTEN</b>	

III. DOCUMENTS CONSIDÉRÉS COMME PERTINENTS		
(SUITE DES RENSEIGNEMENTS INDICÉS SUR LA DEUXIÈME FEUILLE)		
Catégorie *	Identification des documents cités, avec indic. non, si nécessaire, des passages pertinents	N° des revendications visées
A	GB, A, 708409 (COLOMBO) 5 mai 1954	
A	FR, A, 944968 (PISCAGLIA) 21 avril 1949	
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ANNEXE AU RAPPORT DE RECHERCHE INTERNATIONALE  
RELATIF A LA DEMANDE INTERNATIONALE NO.

BE 8800007

SA 21542

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 12/07/88

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
GB-A- 811246		Aucun	
FR-A- 431234		Aucun	
DE-B- 1072867		Aucun	
EP-A- 0074887	23-03-83	FR-A- 2512438 AU-A- 8775082 JP-A- 58060647 OA-A- 7204	11-03-83 10-03-83 11-04-83 30-04-84
FR-A- 2009799	06-02-70	DE-A- 1771502 GB-A- 1260729 US-A- 3623234 DE-A, C 1758766	01-04-71 19-01-72 30-11-71 25-03-71
US-A- 1568791		Aucun	
FR-A- 491174		Aucun	
FR-A- 595664		Aucun	
GB-A- 708409		Aucun	
FR-A- 944968		Aucun	