

COMMONWEALTH OF AUSTRALIA

PATENTS ACT 1952-1973

DECLARATION IN SUPPORT OF CONVENTION OR
NON-CONVENTION APPLICATION FOR A PATENT
OR PATENT OF ADDITION

Insert title of invention.

In support of the Application made for a patent for an invention
entitled: **UNIT FOR GRADING PRODUCE, SUCH AS FRUITS**

Insert full name(s) and address(es) of declarant(s) being the applicant(s) or person(s) authorized to sign on behalf of an applicant company.

I ALBERTO SARDO,
xxx of XEDA INTERNATIONAL
of 58 Rue Pottier
F-78150 Le Chesnay
FRANCE

Cross out whichever of paragraphs 1(a) or 1(b) does not apply

1(a) relates to application made by individual(s)

1(b) relates to application made by company; insert name of applicant company.

do solemnly and sincerely declare as follows:—

1. (a) xxx We are the applicant for the patent of addition
or (b) I am authorized by

XEDA INTERNATIONAL

the applicant..... for the patent to make this declaration on its behalf.

2. (a) xxx We are the applicant for the patent of addition
or (b) Carmelo D'URSO, of 9, square de Tocqueville,
F-78150 Le Chesnay, FRANCE

is the actual inventor..... of the invention and the facts upon which the applicant.....
xxx is entitled to make the application are as follows:—
xxx

The applicant would if a patent were granted on an application made by the said inventor, be entitled to have the patent assigned to it.

3. The basic application..... as defined by Section 141 of the Act was made
in FRANCE on the 11th March 1987.

by XEDA INTERNATIONAL.....

in on the

by

in on the

by

4. The basic application..... referred to in paragraph 3 of this Declaration was the first application..... made in a Convention country in respect of the invention the subject of the application.

XEDA INTERNATIONAL S.A.
Declared at FRANCE this 4th day of January 1989

Capital de F. 2000 000

68, rue Pottier

78150 LE CHESNAY

R.C. Versailles 305 949 802

Tél. (1) 39 54 74 45 - Telex 695 612 F

DAVIES & COLLISON, MELBOURNE and CANBERRA.

Insert place and date of signature.

Signature of declarant(s) (no attestation required)

Note: Initial all alterations.

(12) PATENT ABRIDGMENT (11) Document No. AU-B-14862/88
(19) AUSTRALIAN PATENT OFFICE (10) Acceptance No. 609468

(54) Title

CALIBRATION ASSEMBLY FOR PRODUCTS SUCH AS FRUIT

International Patent Classification(s)

(51)⁴ **B07C 005/18 G01G 011/00**

(21) Application No. : **14862/88**

(22) Application Date : **10.03.88**

(87) WIPO Number : **WO88/06928**

(30) Priority Data

(31) Number **87 03344** (32) Date **11.03.87** (33) Country **FR FRANCE**

(43) Publication Date : **10.10.88**

(44) Publication Date of Accepted Application : **02.05.91**

(71) Applicant(s)
XEDA INTERNATIONAL

(72) Inventor(s)
CARMELO D'URSO

(74) Attorney or Agent
DAVIES & COLLISON, 1 Little Collins Street, MELBOURNE VIC 3000

(57) Claim

1. A unit for grading produce, such as fruits, comprising first transporting means having receptacles which are open in their lower part for receiving the produce, a weighing station comprising weighing means drivable by a motor in the direction of motion of the receptacles, a section of said weighing means projecting into the receptacles so as to carry the produce when it passes into the weighing station, the said weighing means and the said motor being supported by a device for weighing the produce, and a grading station comprising several stations for ejecting the produce from the first transporting means into means for removing the produce, as a function of the weight of the latter.



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

(51) Classification internationale des brevets⁴
B07C 5/18, G01G 11/00

609468

(1) Numéro de publication internationale: WO 88/06928
(43) Date de publication internationale:
22 septembre 1988 (22.09.88)

(21) Numéro de la demande internationale: PCT/FR88/00133

(22) Date de dépôt international: 10 mars 1988 (10.03.88)

(31) Numéro de la demande prioritaire: 87/03344

(32) Date de priorité: 11 mars 1987 (11.03.87)

(33) Pays de priorité: FR

(71) Déposant (pour tous les Etats désignés sauf US): XEDA INTERNATIONAL [FR/FR]; 58, rue Pottier, F-78150 Le Chesnay (FR).

(72) Inventeur; et

(75) Inventeur/Déposant (US seulement): D'URSO, Carmelo [IT/FR]; 9, square de Tocqueville, F-78150 Le Chesnay (FR).

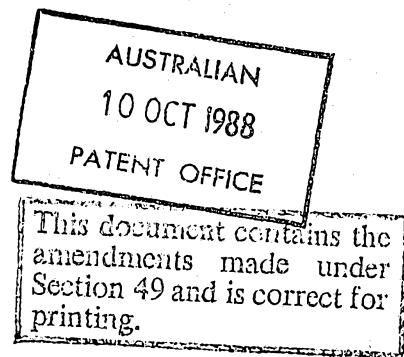
(74) Mandataires: BRESSAND, Georges etc.; Cabinet La-voix, 2, place d'Estienne-d'Orves, F-75441 Paris Cé-dex 09 (FR).

(81) Etats désignés: AU, US.

Publiée

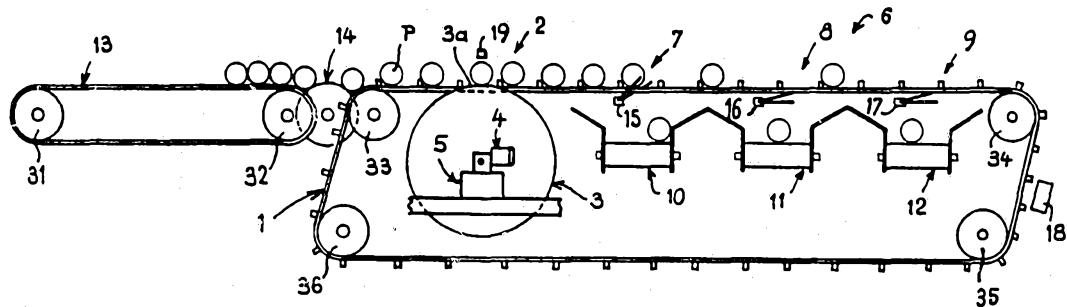
*Avec rapport de recherche internationale.
Avant l'expiration du délai prévu pour la modification des revendications, sera republiée si de telles modifications sont reçues.*

A.O.J.P. 17 NOV 1988



(54) Title: CALIBRATION ASSEMBLY FOR PRODUCTS SUCH AS FRUIT

(54) Titre: ENSEMBLE DE CALIBRAGE DE PRODUITS, TELS QUE DES FRUITS



(57) Abstract

Assembly characterized by the fact that it comprises first transport elements (1) with parallel tracks provided with receptacles, open at the lower end, in which are disposed the products (P), and a weighing station (2) consisting of a weighing wheel (3) driven by a geared motor (4), part (3a) of said wheel projecting into said receptacles, carrying the product (P) on its passage into the weighing station (2). Said wheel (3) and geared motor (4) are supported by a product weighing device (5). A calibration station (6) is also provided, consisting of several product ejection points (7, 8, 9), and first transport elements (1) in product output elements (10, 11, 12), sensitive to product weight.

(57) Abrégé

Cet ensemble est caractérisé en ce qu'il comporte des premiers moyens de transport (1) à brins parallèles, comportant des alvéoles ouvertes dans leur partie inférieure, et dans lesquels sont disposés les produits (P), un poste de pesage (2) comprenant une roue de pesage (3) entraînée en rotation par un motoréducteur (4), et dont une portion (3a) fait saillie dans les alvéoles de manière à porter le produit (P) lors de son passage dans le poste de pesage (2), ladite roue (3) et ledit motoréducteur (4) étant supportés par un dispositif (5) de pesage du produit, et un poste de calibrage (6) comprenant plusieurs stations (7, 8, 9) d'éjection des produits, des premiers moyens de transport (1) dans des moyens (10, 11, 12) d'évacuation des produits, en fonction du poids de ceux-ci.

COMMONWEALTH OF AUSTRALIA

PATENTS ACT 1952

COMPLETE SPECIFICATION

(Original)

FOR OFFICE USE

Class Int. Class

Application Number:

Lodged:

Complete Specification Lodged:

Accepted:

Published:

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

Priority:

Related Art:

Name of Applicant: XEDA INTERNATIONAL

Address of Applicant: 58, rue Pottier, F-78150 Le Chesnay, France

Actual Inventor(s): Carmelo D'URSO

Address for Service: DAVIES & COLLISON, Patent Attorneys,
1 Little Collins Street, Melbourne, 3000.

Complete Specification for the invention entitled:

"UNIT FOR GRADING PRODUCE, SUCH AS FRUITS"

The following statement is a full description of this invention, including the best method of performing it known to us:

The present invention relates to a unit for grading produce, such as fruits.

Previously proposed grading units consist of bucket conveyors in which fruits are placed, for example by means of automatic feed devices.

5 The buckets are connected to the conveyors in a manner such that they may be weighed freely when the latter pass through a first part of the unit and pivot at the moment of discharging the fruit contained in the bucket for grading thereof.

10 The weight of the fruit is obtained by automatically subtracting the weight of the bucket, the weight of the bucket and fruit together as measured, which then makes it possible to control the means for discharging the buckets such that the fruits are classified by weight category.

15 However, these devices present a certain number of drawbacks, the most important of which lies in the fact that it is not possible to eliminate from the measurement the effects of friction deriving from the fact that the bucket is weighed while moving during transport and that, moreover, the vibrations generated by this movement interfere with weighing and reduce the accuracy of the latter.

20 The aim of the invention is therefore to solve these problems by proposing a grading unit which is simple, reliable, of a moderate cost price but which makes it possible to obtain a better accuracy in measuring the weight of the produce and therefore a better grading of the latter.

25 According to the invention, there is provided a unit for grading produce, such as fruits, comprising first transporting means having receptacles which are open in their lower part for receiving the produce, a weighing station comprising weighing means drivable by a motor in the direction of motion of the receptacles, a section of said weighing means projecting into the receptacles so as to carry the produce when it passes into the weighing station, the said weighing means and the said motor being supported by a device for 30 weighing the produce, and a grading station comprising several stations for ejecting the produce from the first transporting means into means for removing the produce, as a function of the weight of the latter.



Advantageously, the unit according to the invention also comprises second means for transporting produce and means for transferring the said produce from the second transporting means into the receptacles of the first transporting means.

The invention will be better understood with the aid of the following description which is given solely by way of example and which is made with reference to the appended drawings, wherein:

- Fig. 1 represents a diagrammatic view of a grading unit according to the invention;
- Fig. 2 represents a block diagram illustrating the operation of the grading unit according to the invention;
- Fig. 3 represents a partial view of the second transporting means and of a transferring wheel which are included in the structure of a unit according to the invention;
- Fig. 4 represents a partial view of first transporting means and of a weighing wheel which are included in the structure of a unit according to the invention;
- Fig. 5 illustrates the operation of the ejection means which are included in the structure of a unit according to the invention;
- Figs. 6, 7, 8 and 9 illustrate different stages of turning a fruit in a unit according to the invention;
- Fig. 10 represents a different embodiment of the first transporting means and of a weighing wheel which are included in the structure of a unit according to the invention;
- Fig. 11 represents another different embodiment of the weighing means which are included in the



structure of a unit according to the invention; and

- Fig. 12 represents another embodiment of transporting means which are included in the structure of a unit according to the invention.

5 As may be seen in Fig. 1, a unit for grading produce according to the invention comprises first transporting means which will also be called transporting means, with parallel belts, comprising receptacles which are open in their lower part and in which the 10 produce P is arranged. The unit according to the invention also comprises a weighing station 2 comprising weighing means consisting, for example, of a weighing wheel 3 driven in rotation by a gear motor 4. A section 3a of the weighing wheel 3 projects into the 15 receptacles of the first transporting means 1 so as to carry the produce when it passes into the weighing station.

The wheel 3 and the gear motor 4 are supported by a device 5 for weighing the produce, this device 20 being itself supported, for example, by the frame of the unit. This device makes it possible to determine the actual weight of the produce by subtracting the weight measured when there is no produce on the wheel from the weight measured when there is.

25 The unit according to the invention also comprises a grading station 6 comprising several stations 7, 8 and 9 for ejecting the produce from the first transporting means 1 into the means for removing the produce, 10, 11 and 12, respectively, as a function of 30 the weight of the latter.

The second means 13 for transporting the produce, which will also be called feed means, and means 14 for transferring the said produce from the second transporting means 13 into the receptacles of the first 35 transporting means 1 are also provided in order to ensure automatic feed.

As may be seen in this Figure, these transferring means 14 advantageously consist of a transferring wheel inserted between the first 1 and the second 13



transporting means. This wheel will be described in more detail below.

Each ejection station comprises ejection means 15, 16 and 17, respectively, which are driven by a control device connected to the weighing device 5 and to a device 18 for detecting the position of the produce with respect to the ejection stations. Moreover, a sensor 19 also makes it possible to detect the presence of a fruit in the weighing station in order to trigger measuring.

As is represented in Fig. 2, which illustrates the operation of a unit according to the invention, the control device 20 receives information from the detection device 19 which indicates to it that a fruit is in a weighing position. The control device 20 then triggers the weighing device 5 so that it performs a measurement and the control device receives from the latter the measurement corresponding to the weight of the wheel/gear motor/produce group, from which it determines the weight of the produce. This weight is then memorized by the control device and, as a function of the position of the produce, indicated by the detection device 18, the control device 20 activates one of the ejection means 15, 16, 17 as a function of the weight of the produce so as to eject the produce into the removal means corresponding to the weight grade determined. The various means described above present no particular problems in implementation and will not be described in further detail.

The produce which is firstly arranged on the transporting means or feed means 13 is transported by the latter to the transferring wheel 14 which ensures their transfer and their positioning, one by one, in the receptacles of the transporting means 1, as illustrated in Fig. 1. The produce then passes into the weighing station 2 and it is then ejected from the first transporting means towards the removal means 10, 11 and 12, which grades them.

The speed of passage of the transferring wheel



14 is at least equal to the speed of passage of the second transporting means 13 and less than the speed of passage of the first transporting means 1 in order to coordinate the various displacements of the produce on the various transporting and transferring means.

Moreover, the weighing wheel 3 and the transferring wheel 14 may also comprise, on their periphery, flaps for receiving the produce so as to facilitate the passage of the produce on the wheels.

The weighing wheel and the transferring wheel may comprise at least two discs of the same diameter separated by a distance which is less than the size of the produce so as to ensure a good support for this produce.

As may be seen in Figs. 3 and 4, the transferring wheel 14 and the weighing wheel 3 may each comprise three discs 21, 22, 23 and 24, 25, 26, respectively, of which the two discs arranged in the extreme positions, that is to say the discs 21, 23 and 24, 26, respectively, have the same diameter, whilst the disc inserted between the first two, that is to say the discs 22 and 25, respectively, have a diameter which is less than the diameter of the two other discs so that the straight lines passing via the periphery of this disc and the periphery of each of the two others together form an angle α of between 100 and 180° , this being in order to provide a good support and a good lateral guiding of the produce.

Moreover, the second 13 and the first 1 transporting means may also comprise at least two elongated elements for transporting and for laterally guiding the produce 27, 28 and 29, 30, respectively. These two transporting elements are advantageously parallel and separated from one another by a distance which is less than the size of the produce so as to form a support and guiding chute for the latter, these elements forming, as may be seen in Fig. 1, loops which are closed around two guiding members 31, 32 for the second transporting means or feed means 13, and four guiding



members 33, 34, 35, 36 for the first 1.

Advantageously, these transporting elements consist of chains on whose links support members 37, 38 and 39, 40, respectively, are fixed, on the upper 5 faces of which the produce bears, as may be seen, in particular, in Fig. 4.

According to one embodiment, the upper faces of the support members 37, 38 and 39, 40 together form, respectively, an angle β of at least 100° . According to one 10 particular embodiment, these upper faces are arranged in one and the same plane.

As is represented in Fig. 4, the receptacles of the first transporting means 1 may be delimited by parts 41, 42 projecting from the transporting elements 15 29 and 30.

Each of the ejection means, for example the means 15 represented in Fig. 5, comprises an actuator 43 arranged below the first transporting means 1 and whose exit shaft 44 comprises at least one ejection finger and, 20 in the example illustrated, two ejection fingers 45, 46 offset angularly so as to eject the produce P in a specific direction following a command from the corresponding actuator onto the removal means, for example, 10.

25 The produce P represented in the figures may consist, for example, of oranges or apples of an approximately spherical shape. However, it should be noted that the unit according to the invention is also suitable for weighing and grading produce, such as pears or 30 avocados, which have a first part whose shape corresponds approximately to a section of a sphere extended by a second part in an approximately frustoconical shape, and in which the first part has a mass greater than the second. In this case, and as is represented 35 in Figs. 6 to 9, the second transporting means or feed means 13 and the transferring wheel 14 form a device for positioning this produce in a specific direction. In fact, the intersection between the second transporting means or feed means 13 and the transferring wheel



14 forms a space, with a flared V-shaped cross section, for turning the produce which arrives with its approximately frustoconical part of smaller mass in front, under the effect of the relative movement of the two branches 5 of the V formed by the opposing sections of the second transporting means or feed means 13 and of this transferring wheel 14. As has been described above, these second transporting means or feed means and the transferring means comprise means for laterally guiding the 10 produce so that its axis is always approximately parallel to the axis of displacement of the second transporting or feed means and the transferring means, such that the produce which arrives with the section of 15 approximately frustoconical shape at the front is set upright and then turned and finally released from this space by the transferring wheel.

It goes without saying that the wheel for transferring the produce may consist of any other transferring means which determines, with the second transporting means or feed means 13, the space with a flared V-shaped cross-section for turning the produce.

As is represented in Fig. 10, which represents a different embodiment of the feed means and/or of the first transporting means, the latter may consist of 25 three transporting elements 47, 48 and 49 consisting, for example, of belts of cylindrical cross-section and in a deformable material, arranged around the guiding means mentioned above.

These guiding means, for example 31, then comprise 30 three guiding grooves 50, 51, 52, one of which is arranged in a section 31a of reduced cross-section for guiding the transporting element 48 arranged between the two others 47 and 49, so that the planes which are tangent to the free surfaces of the said belts together 35 form an angle γ of at least 100° .

In this embodiment, the receptacles of the first transporting means may, for example, consist of pieces 53 in the shape of a bridge extending between the two transporting elements 47 and 49 arranged in the



extreme positions.

As has been represented, the weighing wheel 54 and/or the transferring wheel may comprise four discs 55, 56, 57, 58 ensuring good guiding of the produce 5 when it is transferred and/or when it is weighed.

As may be seen in Fig. 11, which represents another different embodiment of the weighing means which are included in the structure of a unit according to the invention, the weighing station 2 comprising 10 weighing means described above and consisting, for example, of the weighing wheel 3 driven in rotation by the gear motor 4, this wheel and this gear motor being supported by the device 5 for weighing the produce, may also comprise means 60 for gripping the produce when it 15 passes into this station.

Advantageously, the gripping means 60 comprise an auxiliary wheel 61 consisting of a deformable material such as, for example, rubber, arranged above the weighing wheel 3 and with an axis which is parallel 20 to the axis of the latter, so as to provide a weighing passage between these two wheels of a size which is less than the size of the produce.

The auxiliary wheel 61 is driven, at the same speed, in the opposite direction of rotation to the 25 weighing wheel 3 by the gear motor 4, by means of, for example, a system with pulleys and a belt so as to provide a good gripping of the produce when it passes into the weighing station.

As may be seen in this Figure, the produce is 30 then taken between the weighing wheel 3 and the auxiliary wheel 61 which is deformed in an elastic manner so as to avoid any damage to the produce when the produce passes into the weighing station.

It should be noted that the weighing wheel 3 35 and the auxiliary wheel 61 advantageously have the same initial diameter which makes it possible to provide a good gripping of the produce when this produce arrives in the weighing station and thereby avoids round produce, such as, for example, oranges, turning on



themselves when encountering the weighing wheel 3.

It should also be noted that the auxiliary wheel 61 is carried by the measuring device 5 so as not to interfere with measurement.

5 Moreover, this device also makes it possible to increase the accuracy of measurement since the gripping means make it possible to hold the produce when it is weighed.

Finally, and as has been represented in Fig. 10 12, the transporting means may also consist of parallel belts 62 and 63, as described above, on which support studs, for example 64, 65, 66 and 67, 68, 69, respectively, are fixed, these support studs forming, in groups of four, studs for supporting produce which is 15 represented by a dotted line in this Figure.



THE CLAIMS DEFINING THE INVENTION ARE AS FOLLOWS:-

1. A unit for grading produce, such as fruits, comprising first transporting means having receptacles which are open in their lower part for receiving the produce, a weighing station comprising weighing means drivable by a motor in the direction of motion of the receptacles, a section of said weighing means projecting into the receptacles so as to carry the produce when it passes into the weighing station, the said weighing means and the said motor being supported by a device for weighing the produce, and a grading station comprising several stations for ejecting the produce from the first transporting means into means for removing the produce, as a function of the weight of the latter.
2. A grading unit according to claim 1, comprising second means for transporting produce, and means for transferring the said produce from the second transporting means into the receptacles of the first transporting means.
3. A grading unit according to either of the preceding claims, wherein the weighing means and/or the transferring means comprise, on their periphery, flaps for receiving the produce.
4. A grading unit according to claim 2 or 3, wherein the transferring means comprise a transferring wheel between the first and the second transporting means, and the weighing means comprise a weighing wheel driven in rotation by the motor.
5. A grading unit according to claim 4, wherein the weighing wheel and/or the transferring wheel comprise at least two discs separated by a distance which is less than the size of the produce.
6. A grading unit according to claim 5, wherein the or each wheel comprises three discs, one of the discs lying between the two other discs having



a diameter which is less than the diameter of the two other discs so that straight lines passing via the periphery of this disc and the periphery of each of the two others together form an angle of between 100 and 180°.

7. A grading unit according to any one of claims 2 to 6, wherein the speed of passage of the transferring means is at least equal to the speed of passage of the second transporting means and less than the speed of passage of the first transporting means.

8. A grading unit according to any one of the preceding claims, wherein the said first and/or the said second transporting means comprise at least two elongated elements for transporting and for laterally guiding the produce, which are parallel and separated from one another by a distance which is less than the size of the produce so as to form a support and guiding chute for the produce, the said elements forming loops which pass around at least two guiding members.

9. A grading unit according to claim 8, wherein the two transporting elements consist of chains on whose links support members are fixed, upper faces of the support members serving to support the produce.

10. A grading unit according to claim 9, wherein the upper faces of the support members together form an angle of at least 100°.

11. A grading unit according to claim 9, wherein the upper faces of the support members are arranged in one and the same plane.

12. A grading unit according to claim 8, wherein the said first and/or the said second transporting means comprise three transporting elements, said transporting elements consisting of belts of cylindrical cross section and in a deformable material, and each of the said guiding members comprising three



grooves for guiding the elements, one of which is arranged in a part of the guiding member of reduced cross-section for guiding that transporting element arranged between the two others so that planes which are tangential to the free surfaces of the said belts together form an angle of at least 100°.

13. A grading unit according to any one of claims 8 to 12, wherein the receptacles of the first transporting means are delimited by parts projecting from the transporting elements.
14. A grading unit according to any one of claims 8 to 12, wherein the receptacles of the first transporting means are delimited by pieces in the shape of a bridge extending between two transporting elements.
15. A grading unit according to any one of the preceding claims, wherein the ejection stations each comprise means for ejecting the said produce, said ejecting means being responsive to a control device connected to the weighing device and to a device for detecting the position of the said produce with respect to the said ejection means.
16. A grading unit according to claim 15, wherein each of the ejection means comprises an actuator arranged below the first transporting means and at least one ejection finger operative to eject the said produce in a specific direction onto the removal means following a command from the actuator.
17. A grading unit according to any one of claims 4 to 16, wherein the weighing station comprises means for gripping the produce when it passes into this station.
18. A grading unit according to claim 17, wherein the gripping means comprises an auxiliary wheel in a deformable material arranged above the weighing wheel and with an axis which is parallel to the axis of the weighing



wheel, so as to provide a weighing passage of a size which is less than the size of the produce, the auxiliary wheel being driven in the opposite direction of rotation to the weighing wheel by the motor so as to provide a gripping of the produce when it passes into the weighing station.

19. A grading unit according to any one of the preceding claims, wherein the transporting means comprise parallel belts on which studs for supporting the produce are arranged.

20. A grading unit substantially as hereinbefore described with reference to the accompanying drawings.

DATED this 28th day of November, 1990.

XEDA INTERNATIONAL

By its Patent Attorneys:

DAVIES & COLLISON



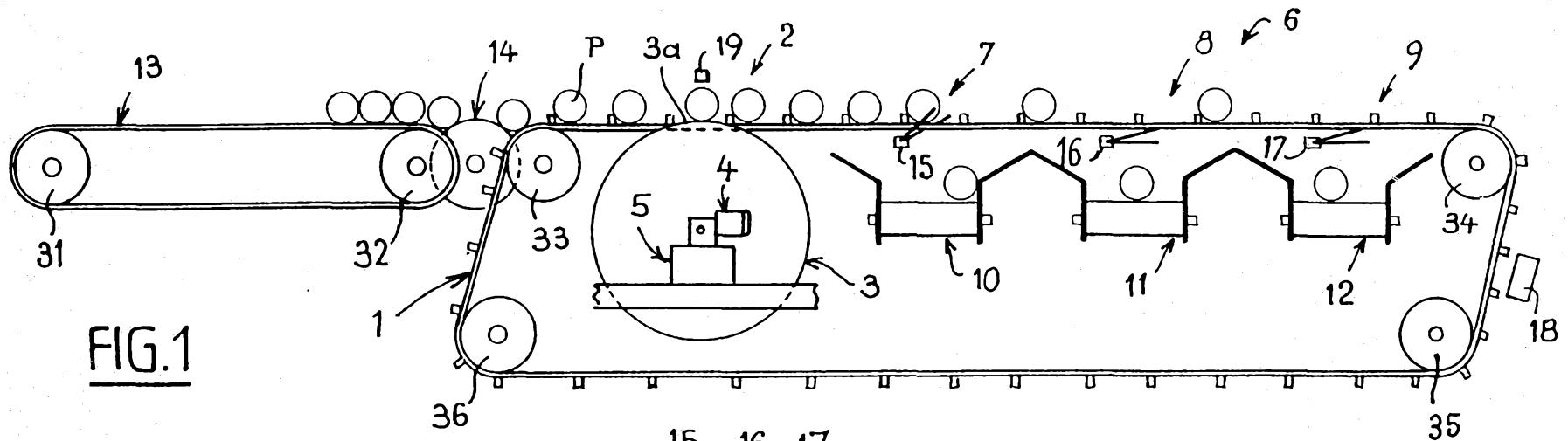


FIG. 1

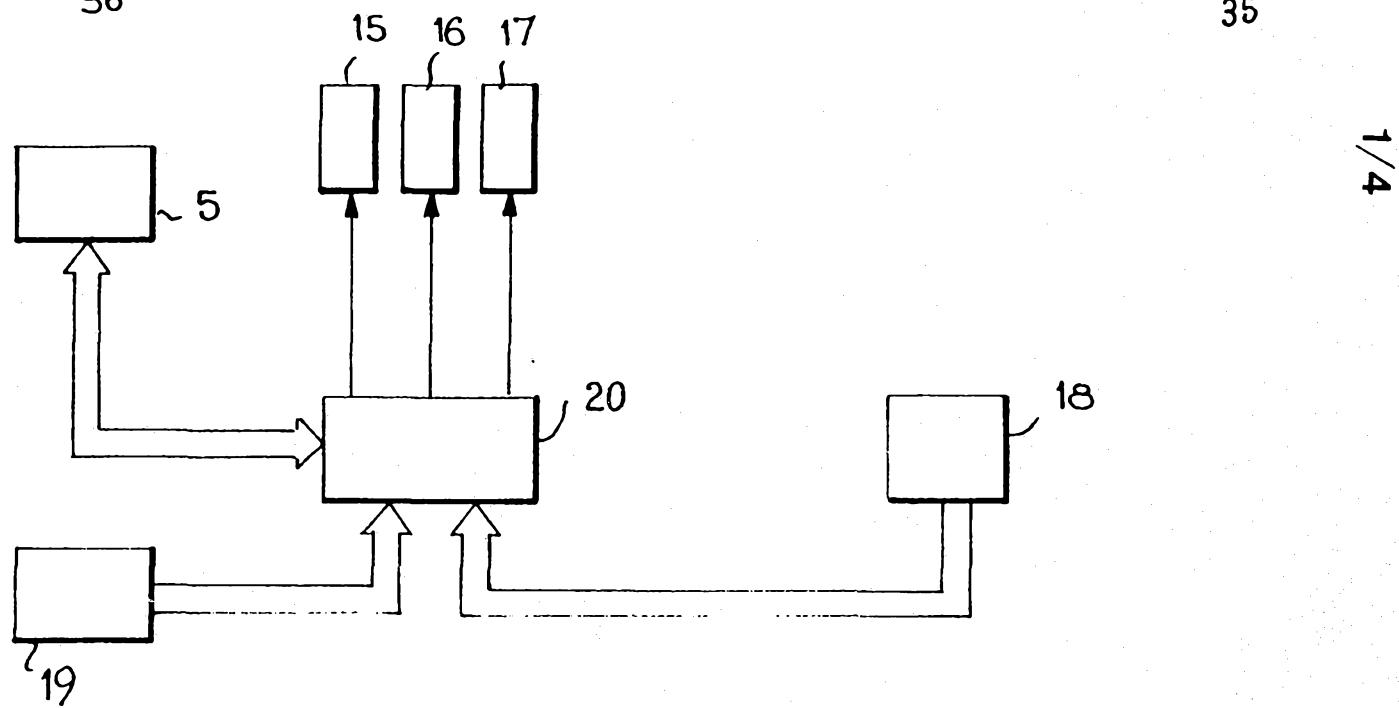
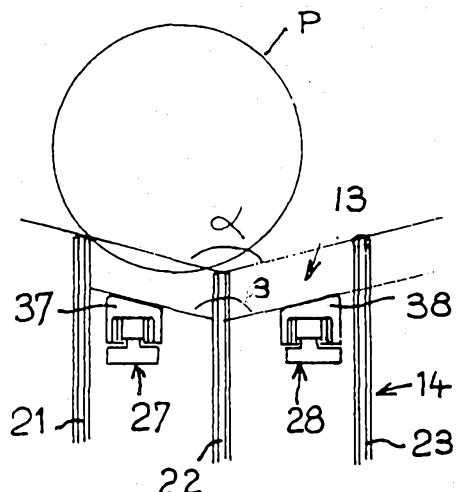
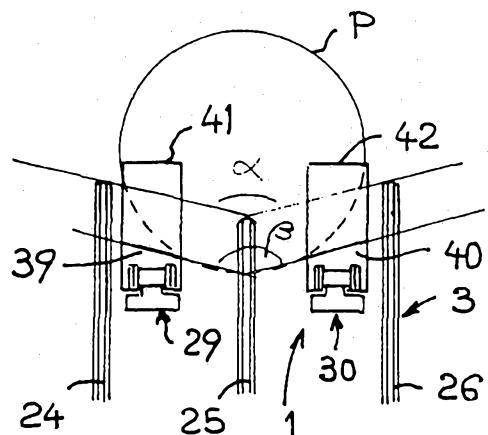
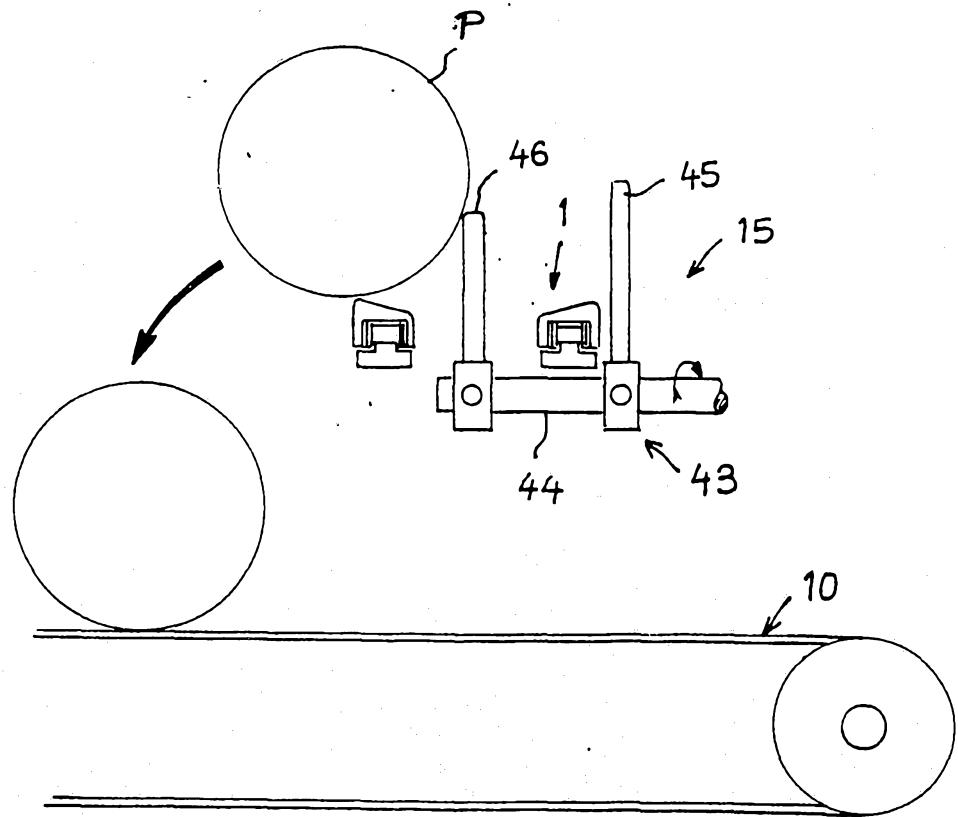
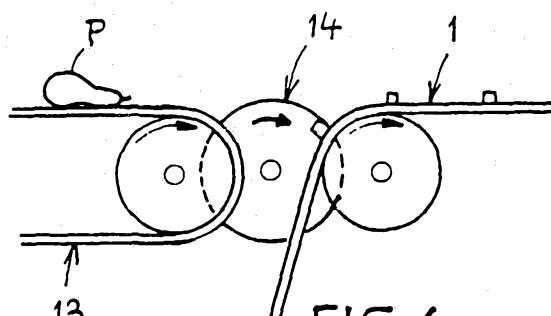
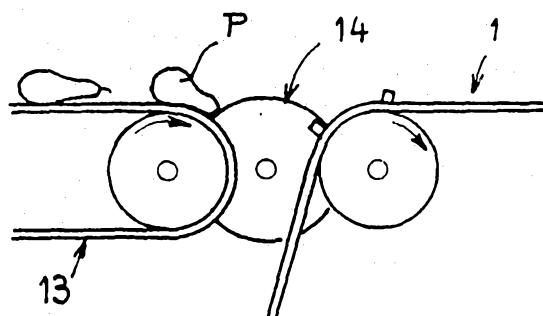
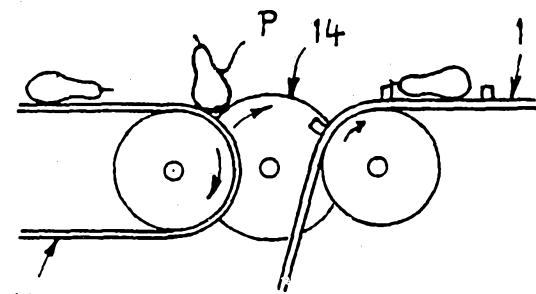
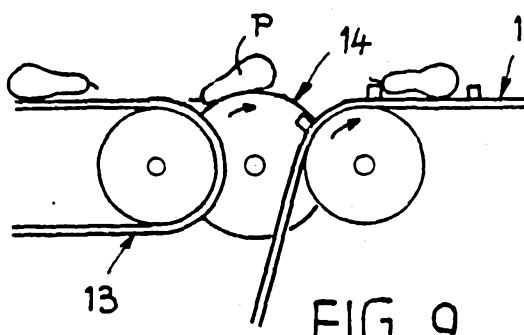
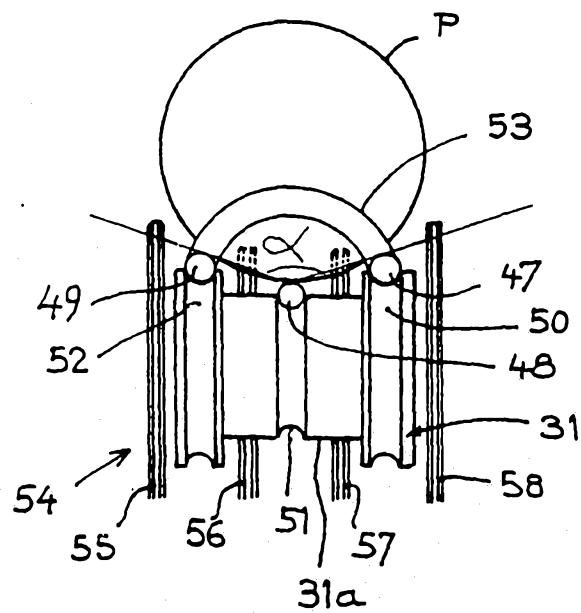


FIG. 2

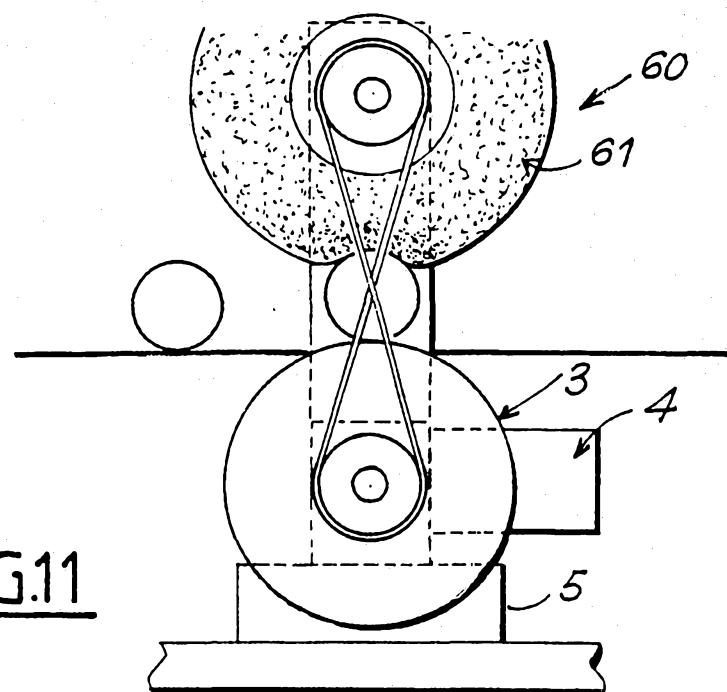
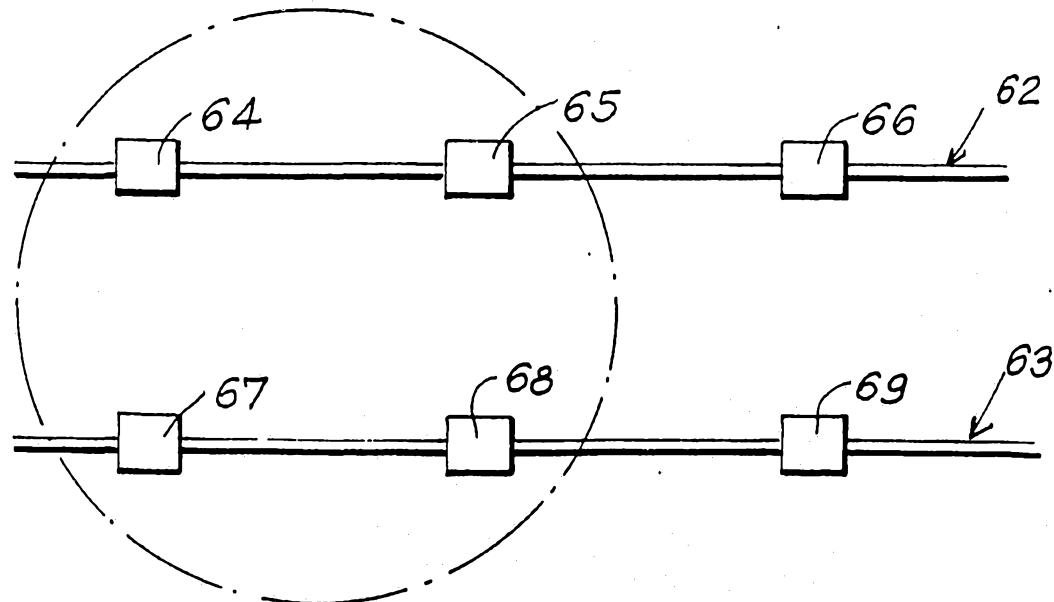
2/4

FIG. 3FIG. 4FIG. 5

3/4

FIG. 6FIG. 7FIG. 8FIG. 9FIG. 10

4/4

FIG.11FIG.12

INTERNATIONAL SEARCH REPORT

International Application No. PCT/FR 88/00133

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 B 07 C 5/18, G 01 G 11/00

II. FIELDS SEARCHED

Minimum Documentation Searched ⁷

| Classification System | Classification Symbols |
|-----------------------|------------------------|
| Int.Cl. ⁴ | B 07 C, G 01 G |

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 ¹⁰ | Citation of Document, ¹¹ with indication, where appropriate, of the relevant passages ¹² | Relevant to Claim No. ¹³ |
|------------------------|--|-------------------------------------|
| A | FR, A, 1306353 (EISENWERK WESERHÜTTE AG) 1962, see figures 1 and 3; page 2, column 1, lines 48-57, 31-37 | 1, 4-6 |
| A | GB, A, 878320 (RESEARCH LTD) 27 September 1961 see page 2, lines 46-58; figure 1 | 1-4 |
| A | GB, A, 2140164 (M.A.P. GALAN) 21 November 1984 see figures 5 and 2; page 2, column 2, lines 93-95, lines 107-113 | 1, 2, 4, 13, 15 |
| A | GB, A, 1395868 (V.D. SHEPOVALOV) 29 May 1975, see page 3, lines 20-25, lines 86-91; page 4, lines 31-33 | 1, 15, 16 |
| A | FR, A, 1238102 (MARCHADOUR) 27 June 1960, see figure 3 | 1, 5, 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 |
|---|---|
| 08 June 1988 (08.06.88) | 14 July 1988 (14.07.88) |
| International Searching Authority European Patent Office | Signature of Authorized Officer |

ANNEX TO THE INTERNATIONAL SEARCH REPORT
ON INTERNATIONAL PATENT APPLICATION NO.

FR 8800133

SA 21350

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 24/06/88. 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 |
|--|------------------|--|--|--|
| FR-A- 1306353 | | Aucun | | |
| GB-A- 878320 | | Aucun | | |
| GB-A- 2140164 | 21-11-84 | BE-A- 899685 DE-A- 3417999 NL-A- 8401581 FR-A, B 2551206 US-A- 4592434 | | 17-09-84 22-11-84 17-12-84 01-03-85 03-06-86 |
| GB-A- 1395868 | 29-05-75 | Aucun | | |
| FR-A- 1238102 | | Aucun | | |

RAPPORT DE RECHERCHE INTERNATIONALE

Demande internationale N° PCT/FR 88/00133

I. CLASSEMENT DE L'INVENTION (si plusieurs symboles de classification sont applicables, les indiquer tous) ¹⁰

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

CIB: ⁴ B 07 C 5/18, G 01 G 11/00

II. DOMAINES SUR LESQUELS LA RECHERCHE A PORTÉ

Documentation minimale consultée ⁸

| Système de classification | Symboles de classification |
|---|----------------------------|
| ⁴ CIB | B 07 C, G 01 G |
| 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 ¹¹ | Identification des documents cités, ¹¹ avec indication, si nécessaire, des passages pertinents ¹² | N° des revendications visées ¹³ |
|-------------------------|--|--|
| A | FR, A. 1306353 (EISENWERK WESERHÜTTE AG) 1962, voir figures 1 et 3; page 2, colonne 1, lignes 48-57, 31-37 -- | 1,4-6 |
| A | GB, A, 878320 (RESEARCH LTD) 27 septembre 1961, voir page 2, lignes 46-58; figure 1 -- | 1-4 |
| A | GB, A, 2140164 (M.A.P. GALAN) 21 novembre 1984, voir figures 5 et 2; page 2, colonne 2, lignes 93-95, lignes 107-113 -- | 1,2,4,13,15 |
| A | GB, A, 1395868 (V.D. SHEPOVALOV) 29 mai 1975, voir page 3, lignes 20-25, lignes 86-91; page 4, lignes 31-33 -- | 1,15,16 |
| A | FR, A, 1238102 (MARCHADOUR) 27 juin 1960, voir figure 3 ----- | 1,5,6 |

* 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)
- « O » document se référant à une divulgation orale, à un usage, à une exposition ou tous autres moyens
- « 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

8 juin 1988

Date d'expédition du présent rapport de recherche internationale

14 JUIL. 1988

Administration chargée de la recherche internationale

OFFICE EUROPÉEN DES BREVETS

Signature du fonctionnaire autorisé

P.C.G. VAN DER PUTTEN

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

FR 8800133

SA 21350

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 24/06/88

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 |
|---|------------------------|---|---------|------------------------|
| FR-A- 1306353 | | Aucun | | |
| GB-A- 878320 | | Aucun | | |
| GB-A- 2140164 | 21-11-84 | BE-A- | 899685 | 17-09-84 |
| | | DE-A- | 3417999 | 22-11-84 |
| | | NL-A- | 8401581 | 17-12-84 |
| | | FR-A,B | 2551206 | 01-03-85 |
| | | US-A- | 4592434 | 03-06-86 |
| GB-A- 1395868 | 29-05-75 | Aucun | | |
| FR-A- 1238102 | | Aucun | | |