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(54) UNIQUE MULTIFUNCTIONAL PRODUCT FOR DETERGENT FORMULATIONS

(57) A multifunctional single product for detergent formulations, produced from natural or partially treated minerals such as phosphoric rock, sodium sulfate ore, trona and silica sand, or intermediate products such as phosphoric acid, sodium carbonate and silica, mixed and reacted in a furnace, to provide the essential oxides of a detergent formulation, as a powder or glass for the partial or total substitution of the actual raw materials of the detergent, which is water soluble and which act as builder, conditioner, filler and carrier, among others, in the detergent and in the process for its manufacture.

EP 1 010 752 A1

Description

BACKGROUND OF THE INVENTION.

A. FIELD OF THE INVENTION.

[0001] This invention refers to a multifunctional single product for detergent formulations, and more particularly, to a product in the form of a powder or a glass, which is water soluble and acts as builder, conditioner, filler and carrier, among others, in the detergent and in the process for its manufacture.

B DESCRIPTION OF THE RELATED ART.

[0002] The most common oxides that are required for the production of detergents are: phosphorus oxide (P_2O_5), sodium oxide (Na_2O), silica (SiO_2), as well as other additional ingredients such as boron oxide (B_2O_3) and others.

[0003] These oxides are normally provided through a plurality of raw materials or chemical compounds, such as the sodium carbonate (Na_2CO_3), sodium tripolyphosphate ($Na_5P_3O_{10}$), sodium sulfate (Na_2SO_4), sodium silicate ($xNa_2O \cdot ySiO_2$) and sodium borate ($Na_2B_4O_7$).

[0004] It is known that each detergent producer has its own formulations, but each producer normally buys and uses the above-mentioned typical chemical compounds as raw materials.

[0005] Researching on the roles or functions performed by each of these compounds, applicants found that each of such compounds performs a task, acting as a builder, as a conditioner, as a filler, as a carrier, as a neutralizing agent, etc. in the detergent and /or in the process for its manufacture.

[0006] Considering that the high number of raw materials which has to be used for each formulation (imparting their respective roles), increases the cost of production of the detergents, (actually, most of the detergent producers have to buy from at least 5 to 8 or more raw materials or reagents to define their formulas), applicants conceived as a goal, the development of a single new multifunctional product for the production of detergents, that would include most of the typical oxides normally included in the detergent formulations, complying with at least some of the main functions, which could perform as the original chemical reagents, which could be soluble in water, and which could reduce the cost of the raw materials.

[0007] To that purpose, applicants observed that the sodium tripolyphosphate, a raw material normally used in the detergent formulation as a source of phosphorus oxide (P_2O_5), is made by reacting phosphoric acid with sodium carbonate; that in turn, the phosphoric acid is obtained from the reaction of the grounded phosphoric rock with sulfuric acid, which is filtered for impurity elimination which is not but silica which is also present in the detergent formulation; and that the sodium carbonate is normally obtained by a process for the benefitiation of the trona ore by impurity elimination which is not but silica which is also present in the detergent formulations.

[0008] Therefore, applicants concluded that, if the impurity compounds are also materials present in the detergent formulations, and that the process for their elimination add a cost to the raw materials and consequently to the final detergent, then the mineral treatment to obtain such raw materials becomes unnecessary and the phosphoric rock or at least the phosphoric acid can be used, through just a partial treatment (such as acid or alkaline attack, as well as grounding, sieving and screening), to produce a product which would be used as a source of P_2O_5 and as a partial source of SiO_2 in the detergent formulations.

[0009] The Na_2O is provided through the sodium carbonate obtained from the treatment of trona mineral by a process including grounding, diluting, filtering to eliminate compounds considered as impurities (which are compounds also used in the detergent formulations) and crystallizing, to obtain the sodium carbonate. Again, applicants concluded that it would be unnecessary to treat the mineral to eliminate something that will be also needed in the detergent formulations, and the trona mineral could be used directly, through a simple grounding step, at more reduced costs, to prepare a single product which would be adjusted to the detergent formulation needs.

[0010] The SiO_2 is provided through the sodium silicate which is obtained from reacting silica sand and sodium carbonate in a furnace. The multifunctional product developed by applicants will provide the silica that the detergent formulation needs.

[0011] In other words, through a single mixture of balanced and treated primary raw materials or minerals which include the sources of oxides for the detergent formulations and a reaction of them in a furnace, it is possible to provide a single multifunctional product for whatever detergent formulation needs.

[0012] With such a product, the detergent producer will have not the need to buy 5 or 8 different raw materials for its formulation, but a single product which is less expensive because it will not include the costs of the purifying processes incorporated in each raw material and because such a product involves just one process, instead of each process to produce each of the actual raw materials.

[0013] This product will provide the oxide needs for the detergent formulation and for its manufacturing process and will perform the essential roles or functions such as builder, conditioner, filler, carrier, neutralizing agent, etc. in detergent formulations and in its manufacturing process.

[0014] Therefore, Applicants found that, by mixing natural or partially treated (grounded or comminuted) primary raw materials or minerals comprising phos-

phoric rock, trona, silica sand, sodium sulfate and/or other intermediate products such as phosphoric acid and sodium bicarbonate, in proportions according to the needs of a specific detergent formulation, and introducing them into a furnace for reacting them, results a single product in the form of: a powder, if the furnace is operated at a lower reacting temperature without melting; as a glass, if the furnace is operated at a reacting and melting temperature; or as a liquid, if the product is solved after it has been obtained as a powder or glass.

[0015] This product can also be used in the processes for producing detergents, instead of all the raw materials used in the conventional processes, to achieve each of the roles or functions as builder, carrier, filler, among others.

[0016] Thus, the obtained product is soluble in water and it will perform the essential roles or functions such as builder, conditioner, filler, carrier, etc. in detergent formulations and in its manufacturing process and results less expensive than the raw materials normally used.

[0017] Furthermore, as it is also known, the detergent producers changed their process technology to produce detergents in the tower process and in the agglomerate process. In both cases they needed almost the same type of raw materials, however they needed solid and liquid raw materials such as sodium tripolyphosphate and sodium silicate. Applicants found that another advantage that the detergent producers can obtain from the product of the present invention, is that this product allows to control the relation of all the oxides, such as P_2O_5/ Na_2O/SiO_2, in a most wide range than by using only the respective raw materials, and will provide just a solid or liquid product.

[0018] And last, but not least, with the product of the present invention, the detergent producer does not have to pay for multiple raw material handling and transportation, nor to pay for transporting some unneeded volatile or gaseous components such as the CO_2, that are present in the raw materials used such as in the sodium carbonate.

SUMMARY OF THE INVENTION.

[0019] It is therefore a main object of the present invention, to provide a multifunctional single product for detergent formulations including most of the typical oxides normally included in the detergent formulations.

[0020] It is also a main object of the present invention, to provide a multifunctional single product for detergent formulations, as a single product performing al least some of the main functions in the detergent formulations such as builder, conditioner, filler, carrier and neutralizing agent, among others, which is soluble in water, and which is less expensive than the raw materials to be substituted.

[0021] It is another main object of the present invention, to provide a multifunctional single product for detergent formulations, of the above disclosed nature, which allows to control the relation of all the oxides, such as $P_2O_5/Na_2O/SiO_2$, in a most wide range than by using only the respective raw materials.

[0022] It is yet another main object of the present invention, to provide a multifunctional single product for detergent formulations, of the above disclosed nature, as a single reacted product, with which the detergent producer will have not to pay for multiple raw materials, handling and transportation thereof nor to pay for transporting unneeded volatile or gaseous components that are an integral part of the raw materials presently used.

[0023] It is a further object of the present invention, to provide a process for producing a multifunctional single product for detergent formulations, by mixing and reacting a balanced mixture of primary raw materials or natural or partially treated minerals such as phosphoric rock, sodium sulfate ore, trona and silica sand, or intermediate products therefrom, into a furnace, to provide a powder or a glass, containing essential oxides for the detergent formulations.

[0024] It is still a further object of the present invention, to provide a process for producing a multifunctional single product for detergent formulations, including an annealing step for the product, in order to provide a desired chemical structure for the product.

[0025] These and other objects and advantages of the product and the process of the present invention will be apparent from the description of the invention, taken in connection with the following detailed description and specific examples thereof

DESCRIPTION OF THE SPECIFIC EMBODIMENTS OF THE INVENTION.

[0026] The invention will now be described firstly regarding the process for the production of the multifunctional single product for detergent formulations and then regarding the preferred products of this invention.

[0027] The process for the production of a multifunctional single product for detergent formulations, of the present invention, comprising:

mixing a balanced mixture of grounded or comminuted primary raw materials or natural or partially treated minerals, comprising phosphoric rock, sodium sulfate ore, trona and silica sand, or intermediate products therefrom; and

reacting the mixture into a furnace to provide a powder or a glass, containing essential oxides for the detergent formulations.

[0028] The reacting step is carried out either, at a temperature under the melting point of the mixture, to produce a powder, or at a reacting and melting temperature of the mixture, to provide a glass.

[0029] If the product is needed as a liquid, depend-

ing on the process for the fabrication of the detergent, the process comprising to dissolve the powder or the glass product in a solvent, to produce a liquid product including most of the typical oxides normally included in the detergent formulations.

[0030] Furthermore, if an specific structure for the product is needed for specific purposes of the detergent producer, a final annealing step for the product can be introduced in the process.

[0031] The single reacted product, in accordance with the present invention include the essential oxides, such as phosphorus oxide (P_2O_5), sodium oxide (Na_2O), silica (SiO_2), balanced in accordance with the specific detergent formulations, which is water soluble and performs as builder, conditioner, filter, carrier and neutralizing agent, in the product and in the process for the manufacturing of the detergent.

[0032] As in the case of the use of sodium sulfate for the manufacturing of glassware articles, wherein only a limited maximum amount of sodium sulfate had been established above which an undesirable separation of phases occurs resulting in two non-miscible liquids, because nobody envisioned nor suggeste to use a phase diagram to establish a balanced optimum amount thereof, in the single product in accordance with the present invention, nobody envisioned nor remotely suggested to react natural or partially treated minerals to provide a single product containing both the essential oxides needed for the detergent formulations, as well as other components also present in the detergent formulations.

[0033] The final oxide content of the product of the present invention will depend on the type and oxide content of the detergent formulation, which detergent producers normally keep secret.

[0034] Therefore, to enable the persons having ordinary skill in the art to carry out the above described invention, the following examples, taken in relation with the corresponding enclosed drawings, are provided only by way of information about the viability of this invention, but without considering that the final product could be used for an specific detergent formulation.

BRIEF DESCRIPTION OF THE DRAWINGS.

[0035]

Figure 1 is a flow sheet of the process for the production of the multifunctional product for detergent formulations, in accordance with a first embodiment of the invention, involving a processing of minerals as primary raw materials for producing a glass for detergent formulations;

Figure 2 is a flow sheet of the process similar to that of Figure 1, involving a processing of partially treated and intermediate primary raw materials, in accordance with a second embodiment of the invention;

Figure 3 is a flow sheet of a simplified process similar to that of Figure 2, for producing a glass for detergent formulations;

Figure 4, is a flow sheet of the process similar to that of Figures 1 and 2, additionally including sodium sulfate, for producing a glass for detergent formulations;

Figure 5 is flow sheet of the process of the present invention, including a step for treating the product of examples 1 to 4, involving an additional amount of sodium sulfate;

Figure 6 is a flow sheet of the process similar to that of Figure 1, to produce a powder product; and

Figure 7 is a flow sheet of a process similar to Figure 5, involving a solving step for the glass or powder product.

[0036] Now the process for the production of the multifunctional product for detergent formulations, in accordance with the present invention will be described by the following performance examples, referring to these drawings, wherein the same numbers refer to the same steps of the figures.

EXAMPLE 1.

[0037] As illustrated in Figure 1, grounded trona ore from a feeder 1 and silica sand from a feeder 2, were fed to a mixer M to homogenize the primary raw materials; the mixture 3 was then introduced into an agglomerator A, to which treated (acid attacked) phosphoric rock from a feeder 4 was added to agglomerate these raw materials to produce a batch 5 having the following weight ratio: $1P_2O_5 : 4Na_2O : 4\ SiO_2$.

[0038] This batch 5 was reacted in a rotary kiln K at a temperature of about 800°C and then the reacted batch 6 was fed to a furnace F to melt the reacted batch 6 at a temperature of about 1200°C, to produce one ton of a glass product 7.

EXAMPLE 2.

[0039] In Figure 2, sodium carbonate from a feeder 1a and a silica sand from a feeder 2 were feed to a mixer M to homogenize the primary raw materials; the mixture 3 was then introduced into an agglomerator A to which phosphoric acid was added from a feeder 4a to agglomerate these raw materials and to produce a batch 5 in the following ratio $1P_2O_5 : 4Na_2O : 4\ SiO_2$.

[0040] This batch 5 was reacted in a rotary kiln K at a temperature of about 800°C and then the reacted batch 6 was fed to a furnace F to melt the batch 6 at a temperature of about 1200°C, to produce one ton of a glass product 7.

EXAMPLE 3.

[0041] As illustrated in Figure 3, the sodium carbon-

ate from the feeder 1a and the silica sand from the feeder 2 were feed to a mixer M to homogenize the primary raw materials; the mixture 3 was then introduced into an agglomerator A to which the phosphoric acid 4a was added to agglomerate these raw materials to produce a batch 5 in the following ratio $1P_2O_5 : 4Na_2O : 4 SiO_2$.

[0042] This batch 5 was directly reacted in the furnace F to melt the batch 5 at a temperature of about 1200°C, to produce one ton of a glass product 7.

EXAMPLE 4

[0043] In accordance with Figure 4, sodium sulfate from a feeder 8 was directly added, in an amount of 10% by weight, to the mixer M containing the natural or partially treated raw materials of the Examples 1 to 3, reacted in the kiln K and melted in the furnace F in accordance with Examples 1 and 2, or directly reacted and melted in the furnace F in accordance with the Example 3, at the same temperature than the above examples, to produce a glass product 7a.

EAXAMPLE 5

[0044] The glass product 7 from Examples 1 to 3 or 7a from the Example 4, was fed to mill ML, milled therein and the milled mixture 9 was fed to a mixer M2 in which an additional amount of sodium sulfate from a feeder 8a was added to milled mixture 9, in a double amount of the weight of the product 7 or 7a, to obtain the product 7b.

EXAMPLE 6.

[0045] Grounded trona ore from feeder 1 and silica sand from feeder 2 were feed to the mixer M to homogenize the primary raw materials; the mixture 3 was then introduced into the agglomerator A in which treated (acid attacked) phosphoric rock from feeder 4 was added to agglomerate these raw materials to produce a batch 5 in the following ratio $1P_2O_5 : 4Na_2O : 4 SiO_2$.

[0046] This batch 5 was directly reacted in the rotary kiln K at a temperature of about 700°C to produce a powder product 7c.

EXAMPLE 7.

[0047] As shown in Figure 7, the product 7 or 7a of Examples 1 to 4, or 7c of the
Example 6 was dissolved in water, at a temperature of 90°C in a dissolver D, to produce a liquid product 7d having a concentration of 33% of the total product.

[0048] In all of the above Examples, the analysis of the resulting product had the same ratio that in the feeding of materials introduced.

[0049] It is finally to be understood that it is possible to add the sodium sulfate directly to the glass, powder and liquid products rather than to the mixer M.

[0050] Furthermore, it is possible to introduce the final product into an annealing equipment at temperatures from room temperature to about 600°C, to produce a desired chemical structure for the product.

[0051] Therefore, it is to be understood that the above products and processes are provided only as specific embodiments of the invention and that the persons having ordinary skill in the art will be able, with the teachings of herein disclosed, to carry out different performing examples with different ratios and steps, which will be within the true scope of the invention as defined in the following claims.

Claims

1. A multifunctional single product for detergent formulations, comprising natural or partially treated primary raw materials or minerals or intermediate products therefrom, balanced, mixed and reacted in a furnace, to provide a product having essential oxides in the detergent formulations, which is water soluble and performs as builder, conditioner, filler, carrier and neutralizing agent, among others, in the detergent formulations and in the process for its manufacture.

2. The multifunctional single product, as claimed in claim 1, wherein the product having the essential oxides in the detergent formulations is in the form of a powder.

3. The multifunctional single product, as claimed in claim 1, wherein the product having the essential oxides in the detergent formulations is in the form of a glass.

4. The multifunctional single product, as claimed in claim 1, wherein the essential oxides in the detergent formulations comprising phosphorus oxide (P_2O_5), sodium oxide (Na_2O), silica (SiO_2), as well as other additional ingredients.

5. The multifunctional single product, as claimed in claim 1, wherein the essential oxides in the detergent formulation come from the natural or partially treated primary raw materials or minerals comprising phosphoric rock, sodium sulfate ore, trona and silica sand.

6. The multifunctional single product, as claimed in claim 1, wherein the natural or partially treated primary raw materials or minerals are grounded or comminuted minerals.

7. The multifunctional single product, as claimed in claim 1, wherein the essential oxides in the detergent formulation come from intermediate products

comprising phosphoric acid, sodium bicarbonate and silica.

8. A process for producing a multifunctional single product for detergent formulations, comprising mixing a balanced mixture of primary raw materials or natural or partially treated minerals, or intermediate products therefrom; and reacting the mixture into a reactor to provide a powder or a glass, containing essential oxides for the detergent formulations.

9. The process as claimed in claim 8, wherein the essential oxides in the detergent formulations comprising phosphorus oxide (P_2O_5), sodium oxide (Na_2O), silica (SiO_2), as well as other additional ingredients.

10. The process as claimed in claim 8, wherein the essential oxides for the detergent formulation come from a single product comprising natural or partially treated primary raw materials or minerals including phosphoric rock, sodium sulfate ore, trona and silica sand.

11. The process as claimed in claim 8, wherein the essential oxides for the detergent formulation come from intermediate products comprising phosphoric acid, sodium bicarbonate and silica.

12. The process as claimed in claim 8, wherein the step of reacting the mixture into a furnace, is carried out at a temperature under the melting point of the mixture, to produce a powder.

13. The process as claimed in claim 8, wherein the step of reacting the mixture into the furnace, is carried out at a reacting and melting temperature of the mixture, to provide a glass.

14. The process as claimed in claim 8, wherein the reacting step is carried out at a temperature from room temperature to about 600°C.

15. The process as claimed in claim 8, comprising dissolving the product in a solvent, to produce a liquid product for the detergent formulations.

16. The process as claimed in claim 8, comprising thermally treating the glass or powder product to modify the chemical structure of the product.

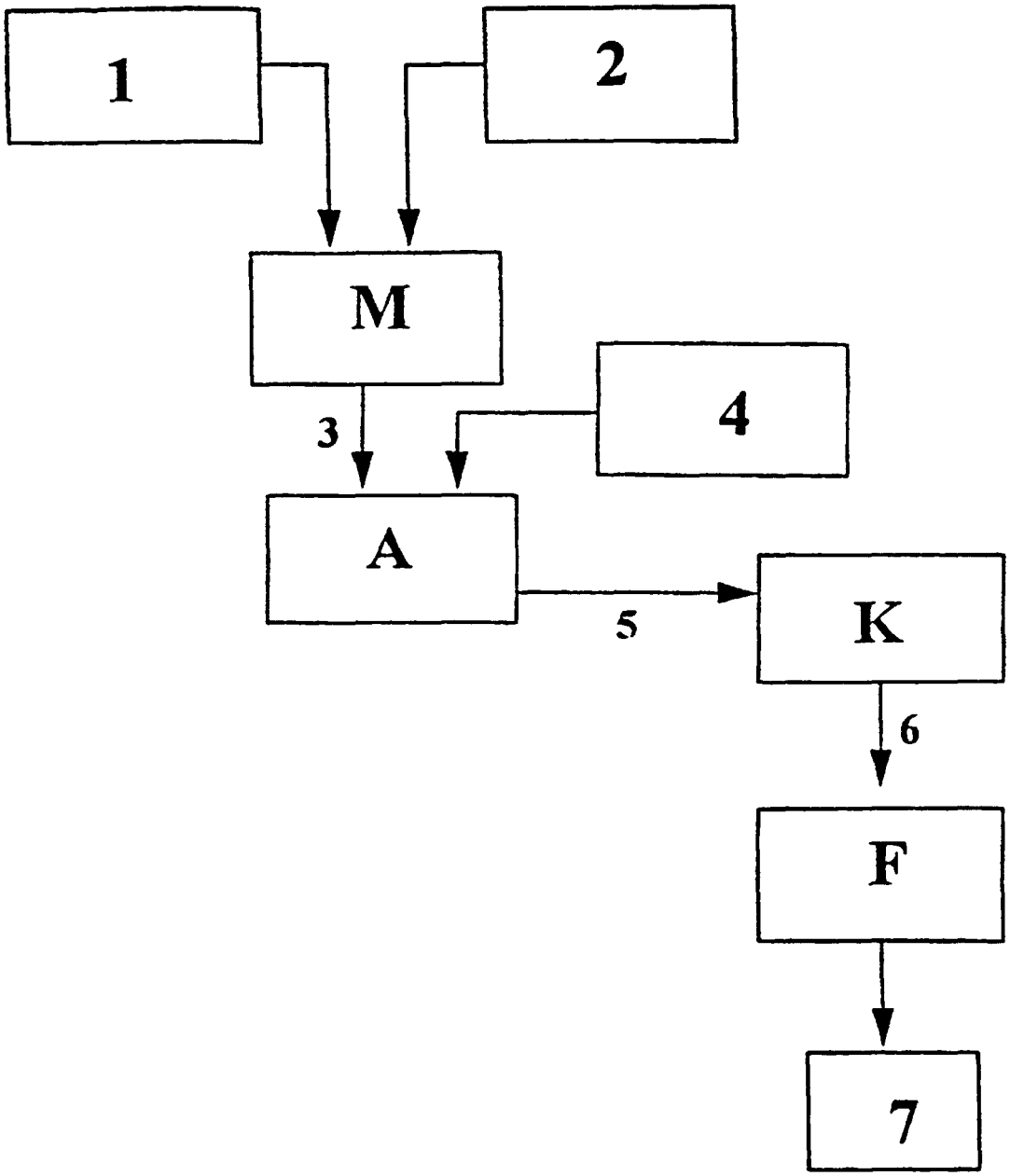

Figure 1

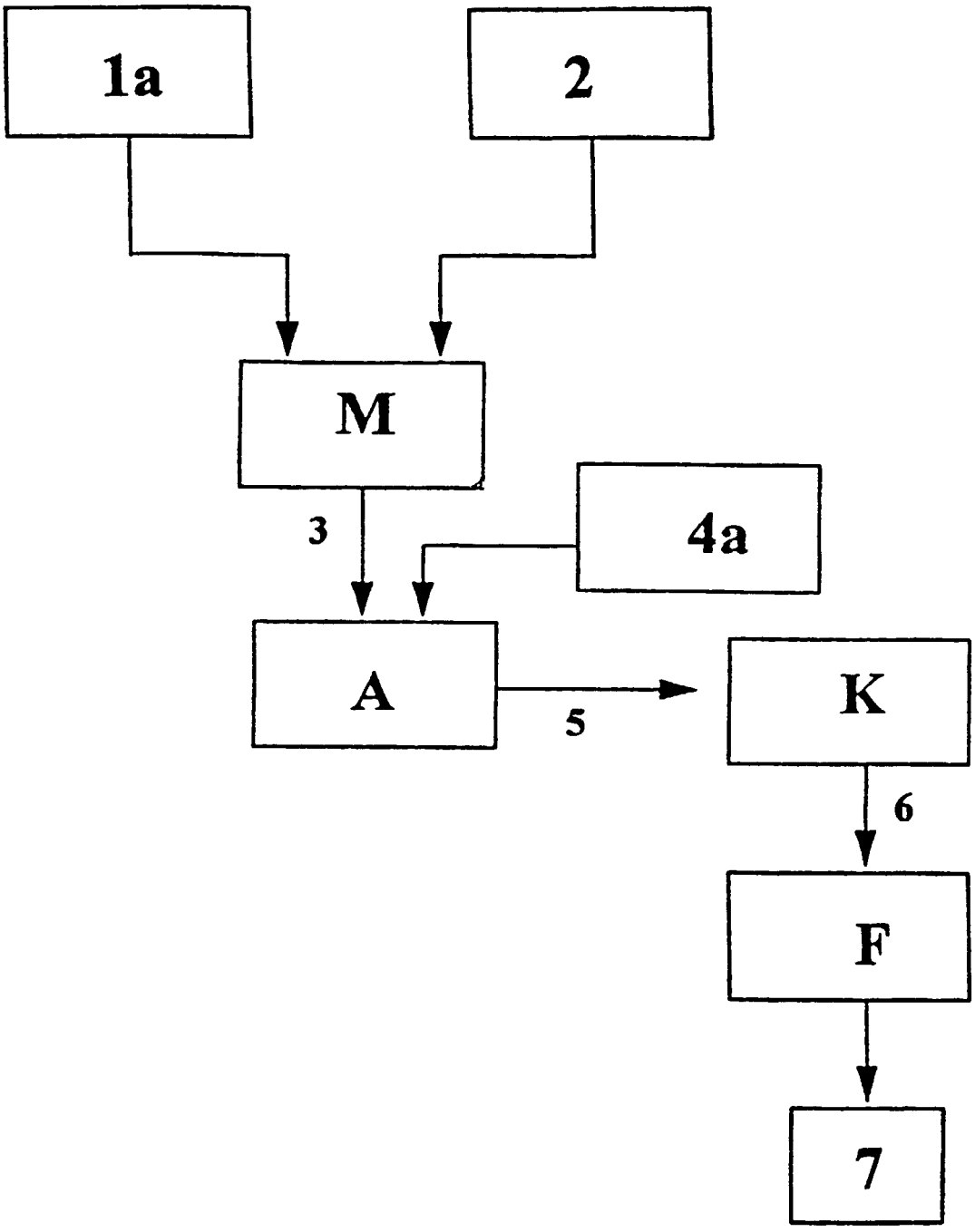

Figure 2

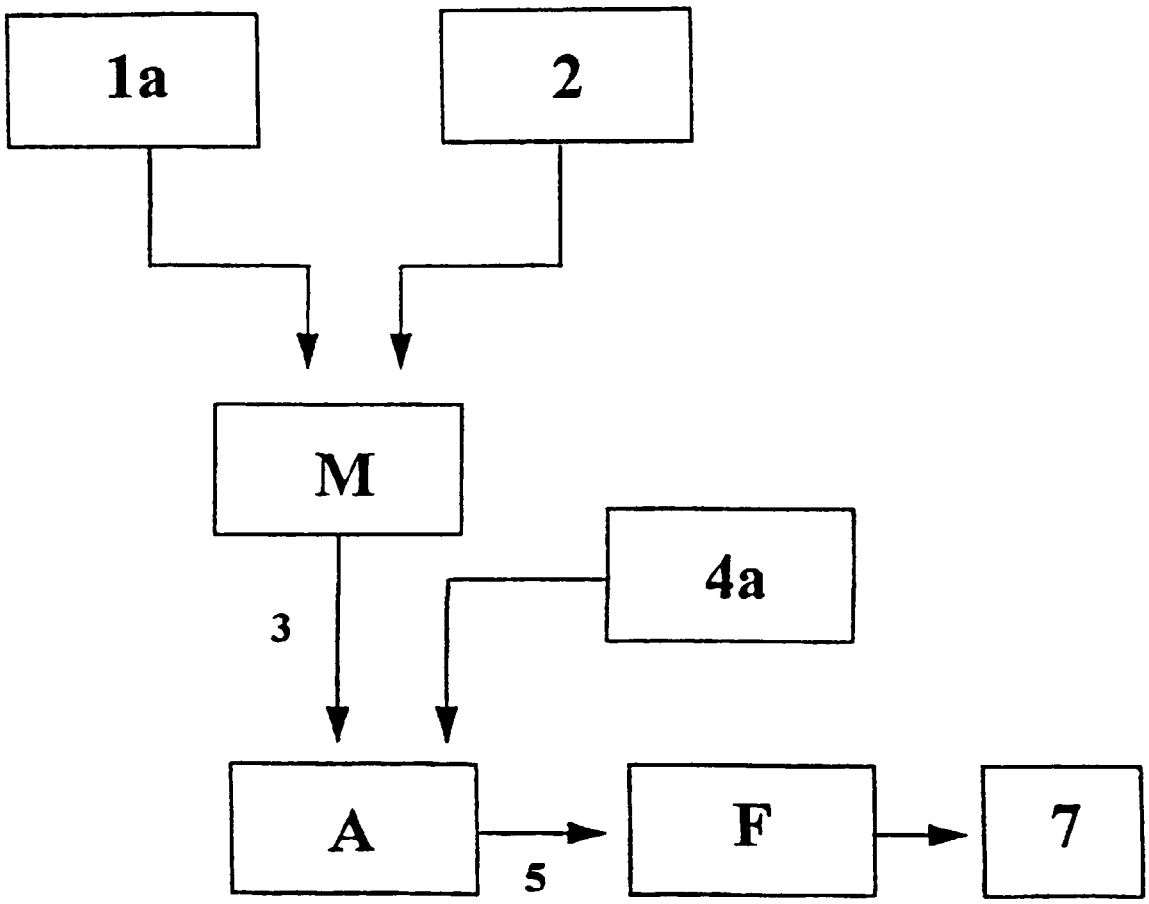

Figure 3

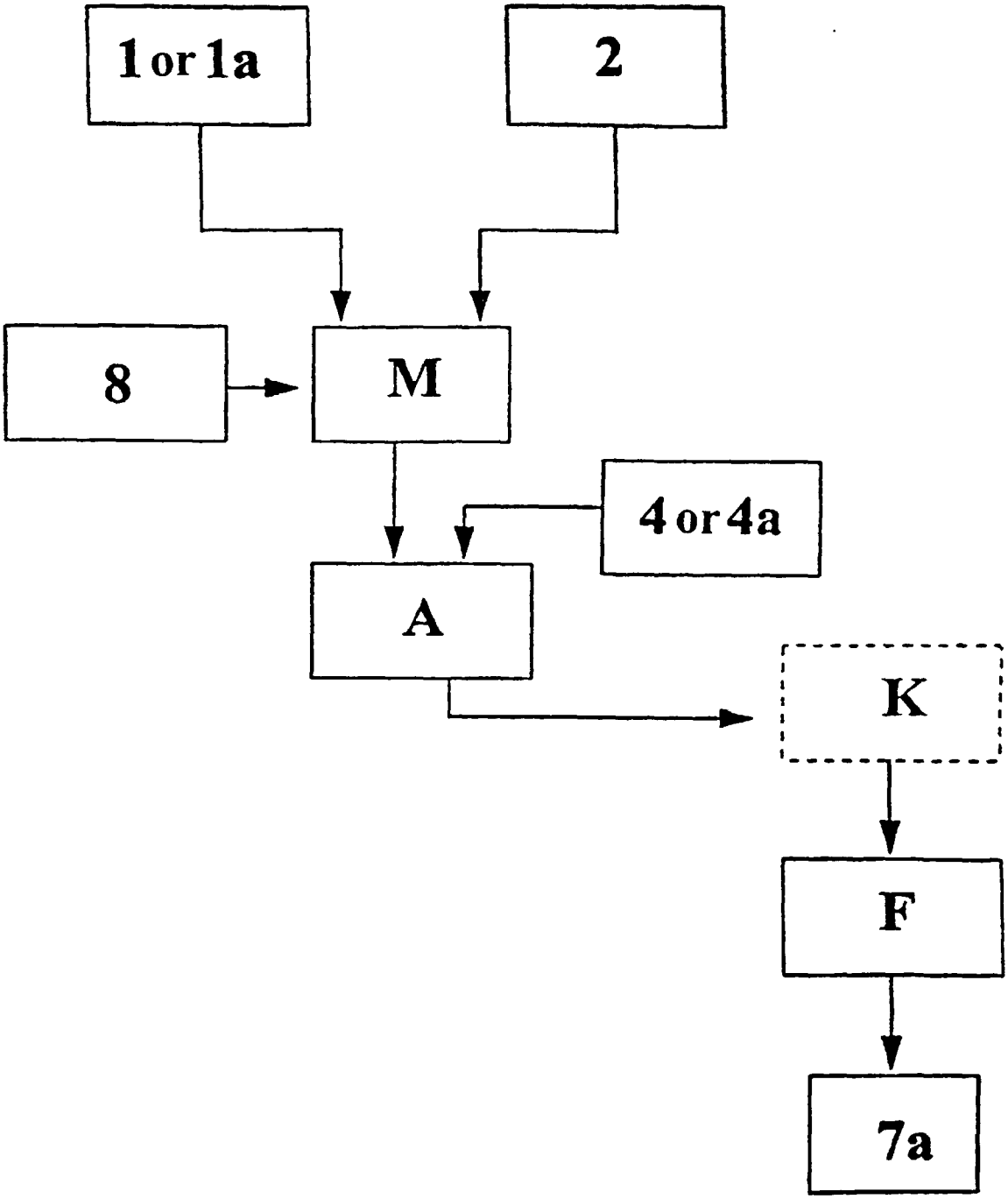

Figure 4

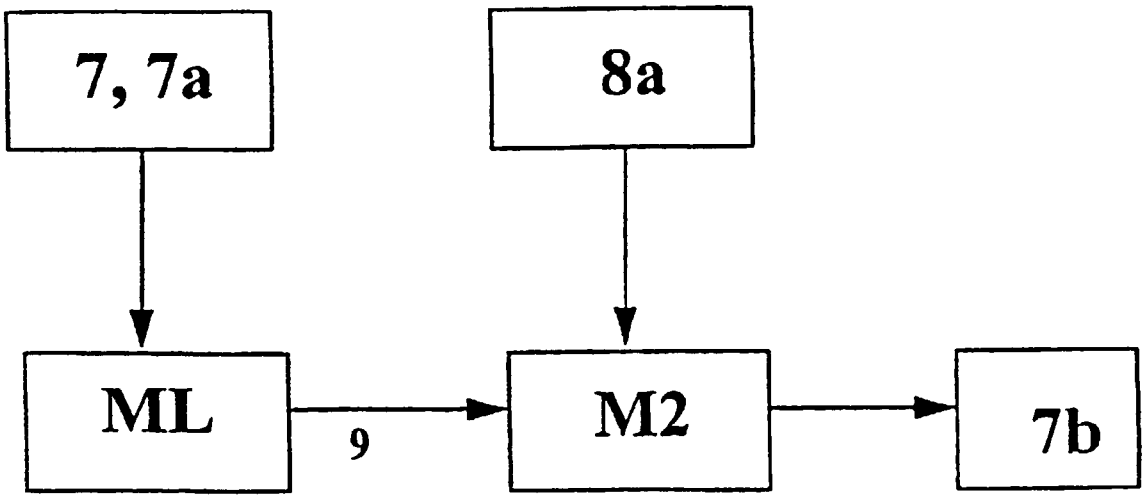

Figure 5

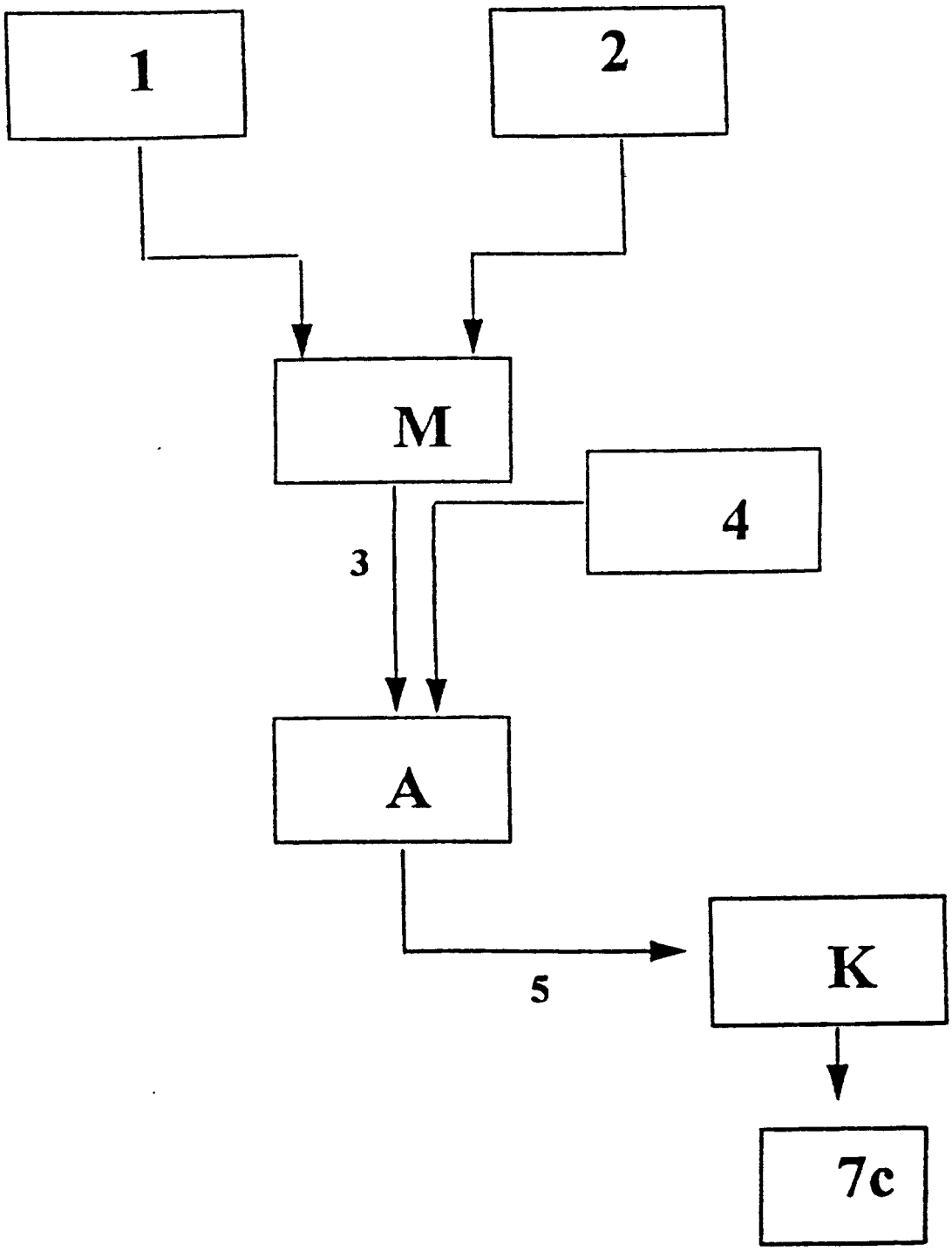

Figure 6

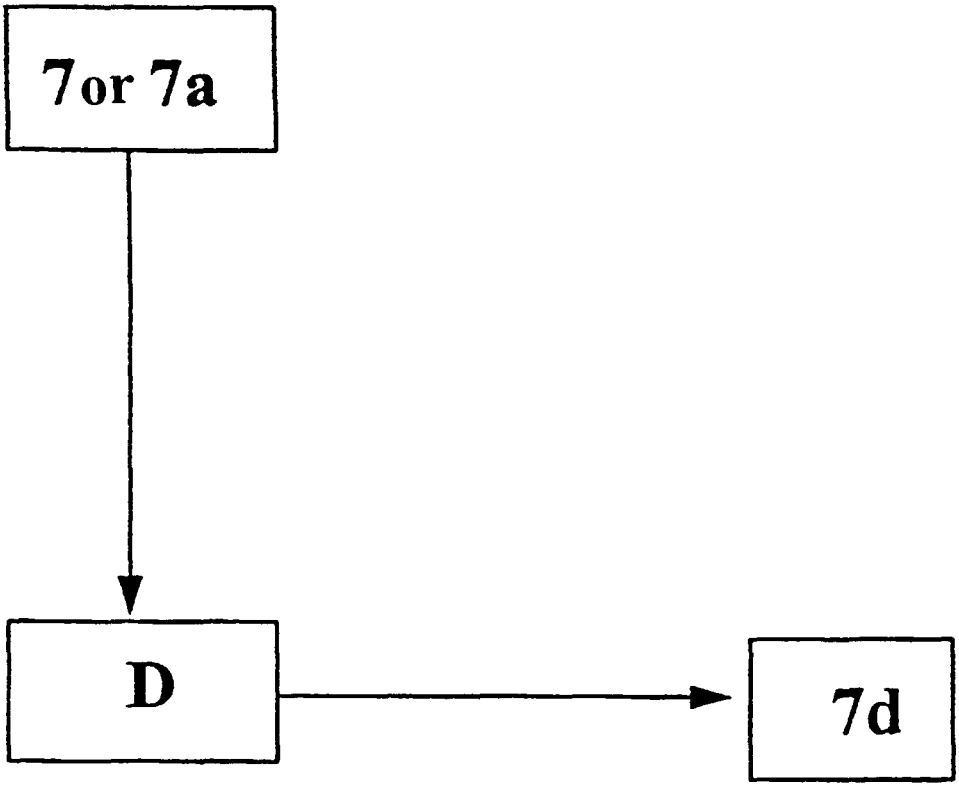

Figure 7

INTERNATIONAL SEARCH REPORT

International application No.
PCT/MX 98/00023

A. CLASSIFICATION OF SUBJECT MATTER

IPC 6: C11D 11/00, C11D 7/04, C11D 7/14, C11D 7/16

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC 6: C11D+, C01B+

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

CIBEPAT, EPODOC, WPI,

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	US 5393446 A (MATSUMOTO) 28 February 1995 (28.02.95) column 2, lines 17-51	1-16
A	data base WPI in EPOQUE, week 9632, London: Derwent Publications Ltd., AN 96-318724, JP 8143309 A (TOKU), abstract	1-16
A	data base WPI in EPOQUE, week 9427, London: Derwent Publications Ltd., AN 94-221552, JP 6157026 A (KAO CORP) abstract	1-16
A	data base WPI in EPOQUE, week 9619, London: Derwent Publications Ltd., AN 96-184482, JP 8059225 A (TOKU) abstract	1-16

☐ Further documents are listed in the continuation of Box C. ☒ See patent family annex.

* Special categories of cited documents:

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"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

Date of the actual completion of the international search	Date of mailing of the international search report
4 November 1998 (04.11.98)	11 November 1998 (11.11.98)
Name and mailing address of the ISA/ S.P.T.O	Authorized officer ELENA ALBARRAN
Facsimile No.	Telephone No.

Form PCT/ISA/210 (second sheet) (July 1992)

INTERNATIONAL SEARCH REPORT

Information on patent family members

International Application No
PCT/MX 98/00023

Patent document cited in search report	Publication date	Patent familiy member(s)	Publication date
US 5393446 A	28.02.1995	US 5433882 A JP 6206757 A JP 7118699 A	18.07.1995 26.07.1994 09.05.1995
JP 8143309 A	04.06.1996	NONE	
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JP 8059225 A	05.03.1996	NONE	

Form PCT/ISA/210 (patent family annex) (July 1992)