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(71) Applicant: **Fong's National Engineering (Shenzhen) Co., Ltd.**
Shenzhen, Guangdong 518000 (CN)

(72) Inventor: **TSUI, Tak Ming William Tsing Yi**
Hong Kong (CN)

(74) Representative: **Hanna Moore + Curley Garryard House**
25/26 Earlsfort Terrace
Dublin 2, D02 PX51 (IE)

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(54) **APPARATUS AND METHOD FOR PRE-TREATING FABRIC IN VAT**

(57) This patent application provides a device and method to pretreat fabric inside the dyeing machine. When fabric is cycling in the dyeing machine, steam nozzle can be installed after fabric delivery channel, spraying high temperature steam to the fabric; releasing internal

stress and improve cycling smoothness. This can effectively reduce repeated folding on fabric, reduce dyeing time and dehydrate fabric. Operators will not require pre-treatment device to achieve the same result, saving energy, reducing carbon foot print and cost.

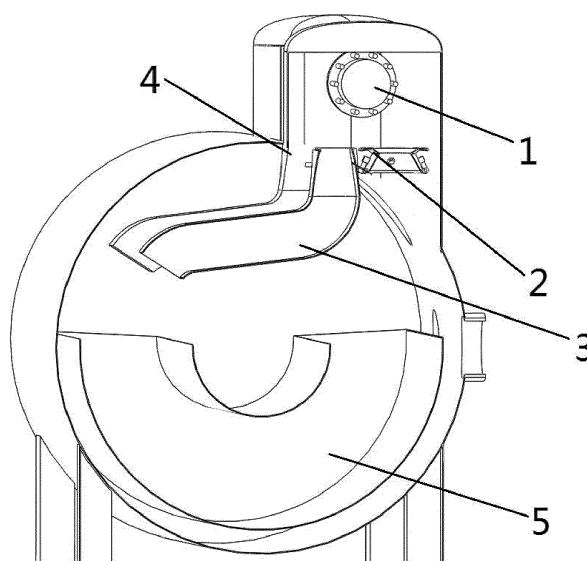


Figure 1

Description

Technical Field

[0001] This invention patent describes a device that pretreats fabric internally with steam and its method thereof which is applied in fabric dyeing machine in the textile industry.

Background of the Invention

[0002] A conventional cloth dyeing machine consists of spraying nozzle and storage trough with a fabric looping continuously inside the machine. When fabric passes through the dyeing nozzle, it enters the storage trough through the plaiting device. But different fabric consists of different weaving patterns and materials, therefore heavier fabric might be folded or twisted when passing through the spraying nozzle; if the fabric maintains this folded or twisted pattern for a few cycles, non-reversible folding marks will be created on the fabric. Some dyeing factories will use aerodynamic dyeing machines that are able to unfold or unwind the fabrics using high pressure air from the nozzle to avoid this problem. However, aerodynamic dyeing machines cost relatively more and have higher electricity consumption comparing with normal dyeing machines; therefore they are less appealing to some dyeing factories.

[0003] There are also other potential problems with aerodynamic machines. Although the implementation of air nozzle can reduce the uneven color distribution effect on fabrics, but this is less effective on heavier fabrics where it is more difficult to unfold fabrics with high pressure air. The current solution is to increase the cycling time and raise the power of the air and water pump to get a higher flow and pressure dyeing solution in the nozzle. This approach can open up the folds and increase the cycling speed but with the consequences of higher energy consumption and possibility in damaging fabric surfaces. Another solution is to heat up the fabrics before the dyeing process. This will soften the fabric, increase cycling speed and reduce uneven color distribution during the dyeing process. This method of heating up the fabric before the dyeing process requires extra labor to move the fabric to the pretreat machine, sacrificing labor, time, power and productivity. This invention patent aims to improve the above difficulties faced in the dyeing industry.

Disclosure of the invention

[0004] This invention patent aims to compensate on the current shortcoming of the technology, providing an internal pretreat device and methodology, treating fabrics directly inside dyeing machine with steam, altering its structural properties, aiding the dyeing process afterwards.

[0005] This invention patent application provides a fab-

ric pretreat system apparatus. This system includes storage trough, roller and plaiter. The plaiter inlet is installed with fluid nozzle and steam nozzle is installed on the fabric pathway, spraying steam to fabric along the way.

[0006] Moreover, the described fabric spraying device is installed between storage trough and the roller.

[0007] Furthermore, the described steam spraying nozzle is installed between storage trough and the roller, attached to plaiter mount.

[0008] Moreover, the design consists of one or more steam spraying devices.

[0009] Moreover, the described steam spraying device includes device body, connection tubes, steam nozzle, steam pipes, steam outlet and steam generator. Steam generator is connected with steam pipes and steam nozzle is installed on the steam pipes with steam nozzle being the steam outlet, extruded from device body.

[0010] Furthermore, the described connection tube is attached to the plaiter.

Moreover, the described connection tube is attached to the plaiter with a detachable mount.

Furthermore, the described device is ring shaped, with steam pipes circularly installed around the device body. The ring shaped steam outlet is inside the device body.

Furthermore, the described design has one or more steam pipes.

Similarly, the design also has one or more steam nozzle. This invention patent application also aims to provide a solution to pretreat fabric inside the dyeing machine. The steam nozzle will spray steam to the fabric along the fabric pathway, releasing internal stress, enabling a smooth operation, reducing fabric stacking drastically.

[0011] Furthermore, the described method is to install steam spraying device along the fabric pathway. This device includes connection tube, steam nozzle, steam pipes, steam outlet and steam generator. The steam generator is connected with steam tubes and the steam nozzle is installed on the steam tube with it being the steam outlet, extruding out from the device body. The above device sprays steam to the fabric, releasing internal stress; reducing fabric stacking drastically.

[0012] This invention patent describes internal fabric pretreat device and method. When fabric is cycling inside the dyeing machine, the steam nozzle placed after fabric delivering channel and before plaiter can spray steam to the fabric, releasing internal stress, allowing a smoother cycling, reducing fabric stacking drastically. Dyeing solution penetration has also been increased, resulted in a much more even color spread on the fabric and reduced dyeing time. The high temperature steam can also extract moisture out of the fabric, eliminated the needs for pretreatment machine to achieve the same result, lowering energy cost, carbon footprint and production cost.

Description of the drawings

[0013]

Figure 1 shows the layout of different mechanical components of the system.

Figure 2 shows the example dyeing machine steam nozzle structure layout.

Figure 3 shows the example dyeing machine steam nozzle section view.

[0014] Thereinto: 1 - roller, 2 - high temperature steam device, 3 - plaiter, 4 - fluid nozzle, 5 - storage trough, 22 - steam nozzle, 23 - connection tube, 24 - steam pipe and 25 - steam outlet.

Embodiments of the invention

[0015] The example and figures below describes the technical solution of this patent to give a better understanding to the public, but the patent technical solution will not be bounded by this description.

[0016] Figure 1 shows the schematic of the dyeing machine and other mechanical components. Fabric enters the machine through fabric storage trough 5, being bought up by roller 1. After passing through fabric storage trough 5, the fabric enters the steam spraying device 2 and descends to the dyeing solution nozzle 4 and enters plaiter 3. It falls back to the storage trough 5 and the above steps repeats as the fabric cycles.

[0017] As shown in figures 2-3, this invention patent of pretreating fabric inside dyeing machine has a steam spraying device 2, in this example, steam spraying device includes device body, the described device on plaiter 3, connected through connection tube 23 with plaiter 3, steam generator (not shown in figure) is connected with steam pipe 24, steam nozzle 22 is installed on steam pipe 24, steam outlet 25 is the steam exit for steam nozzle 22, the connection tube 23 is extruded from device body. When fabric passes through the steam spraying device 2, steam will enter steam pipe 24 into steam nozzle 22, exiting form steam outlet 25 to the fabric. When fabric is in contact with steam combined with the high temperature, pressure, and air flow, internal stresses are released and the fold marks will disappear.

[0018] Using the device in this invention patent to pre-treat fabric in dyeing machine, when fabric is cycling in the machine, steam nozzle can be installed before plaiter and after fabric delivery channel, spraying fabric with high temperature steam, releasing internal stresses. This can improve cycling smoothness, reduce the possibility of stacking, improve dyeing solution penetration and shorten dyeing time. The high temperature steam will de-moisturize fabric, excluding the needs of fabric pretreat machine to achieve the same dyeing result. Reduced energy consumption, carbon foot print and cost can be achieved.

[0019] It should be noted that the technical solution will not be bounded by the above content including figures in anyway. Designs with same or similar improved working principle including size, geometry, material and replacing parts with similar functionality are all protected in this patent.

Claims

1. A device that pretreats fabric internally, **characterized in that:** includes storage trough, roller and plaiter, and fluid nozzle is installed on the plaiter inlet and a steam spraying device installed along the fabric pathway to supply steam during operation.
2. A device that pretreats fabric internally according to claim 1, **characterized in that:** the described steam spraying device setup between storage trough and roller.
3. A device that pretreats fabric internally according to claim 2, **characterized in that:**
the described steam spraying device setup between storage trough and roller, attached to plaiter.
4. A device that pretreats fabric internally according to any one of the claim 1-3, **characterized in that:** the quantity of the described steam spraying device is one or more than one.
5. A device that pretreats fabric internally according to any one of the claim 1-3, **characterized in that:** the described steam spraying device includes device body, connection tubes for fixing, steam nozzle, steam tubes, steam outlet and steam generator, and steam generator and steam tubes are connected and steam nozzle is installed on the steam tube with steam nozzle being the exit end, and the connection tube extrudes from the device.
6. A device that pretreats fabric internally according to claim 5, **characterized in that:** the described connection tube attached to platier.
7. A device that pretreats fabric internally according to claim 6, **characterized in that:** the connection tube and the platier are dismountably connected .
8. A device that pretreats fabric internally according to claim 5, **characterized in that:** the said device body is ring-shaped, and the steam tube surrounds device body and steam outlet installed inside device inner wall.
9. An method that pre-treat fabrics inside the dyeing vessel, **characterized in that:** steam spraying device is installed in fabric pathway, which sprays steam to the fabric to make the fabric release tension, ensuring smoothness of the operation and reducing possibility of fabric clogging.
10. An method that pre-treat fabrics inside the dyeing vessel according to claim 9, **characterized in that:**

installing steam nozzle along fabric pathway. The described steam nozzle includes device housing, connection tubes, steam nozzle, steam tubes, steam outlet and steam generator, steam generator is connected with steam tubes, and steam nozzle is installed on the steam tube with the end being the steam outlet, and Connection pipe attached to the device body, the described steam spraying device spray steam to the fabric to release stress, enabling smooth operation and decrease over-stacking effect.

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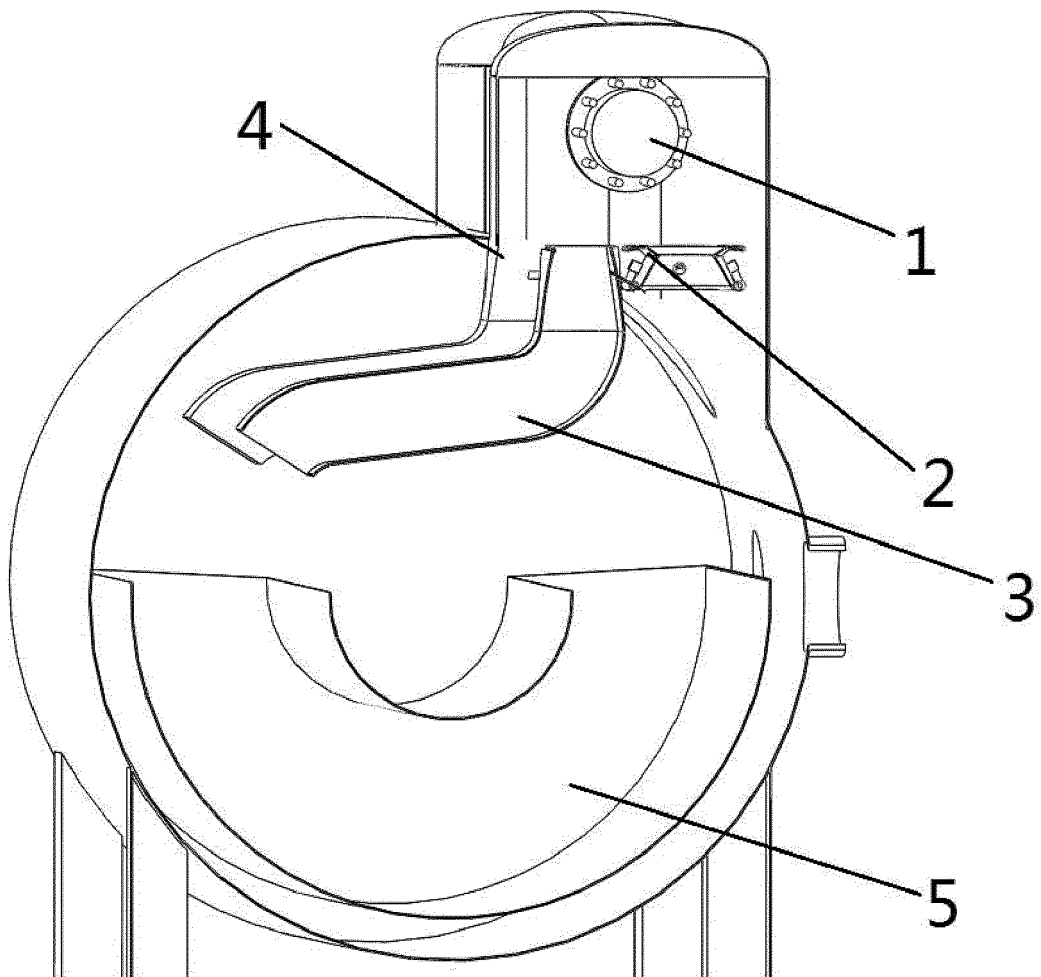


Figure 1

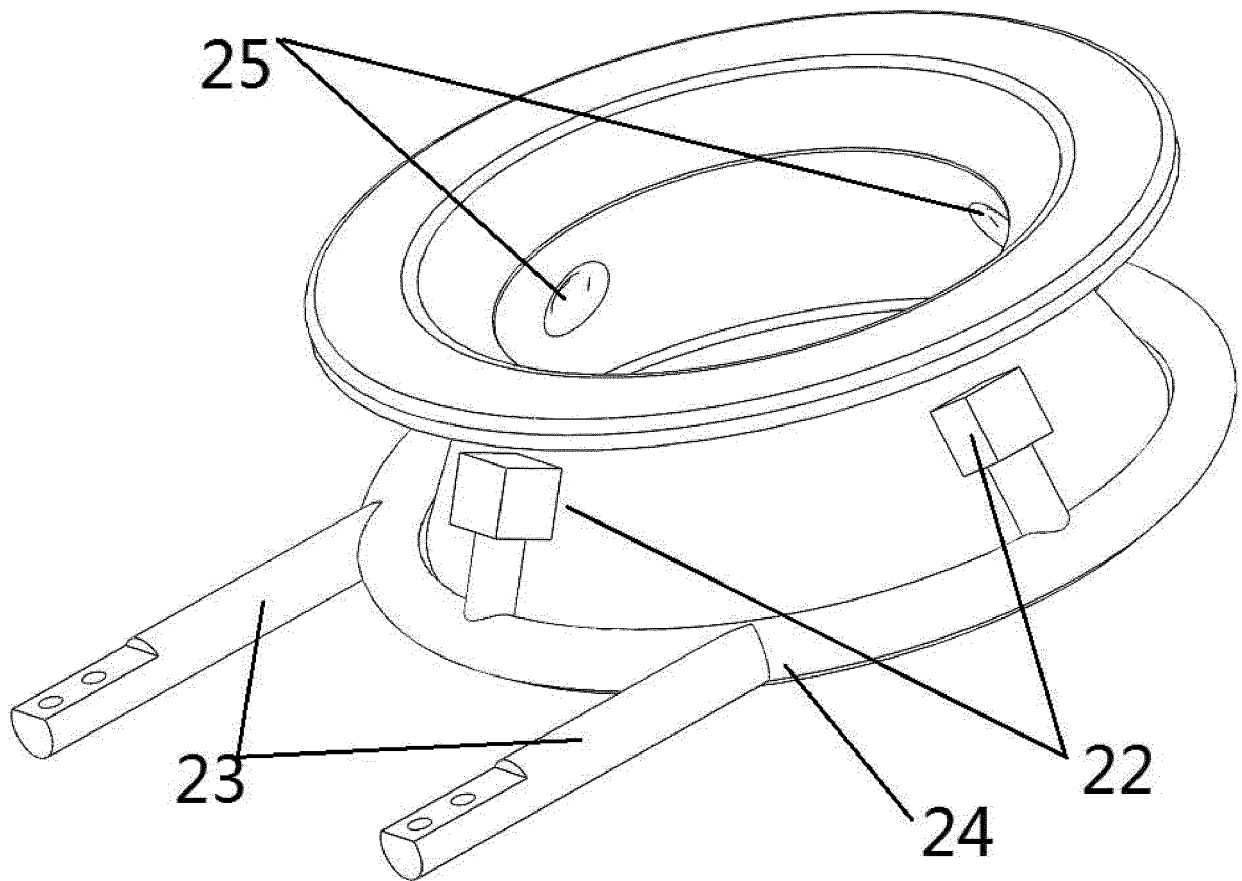


Figure 2

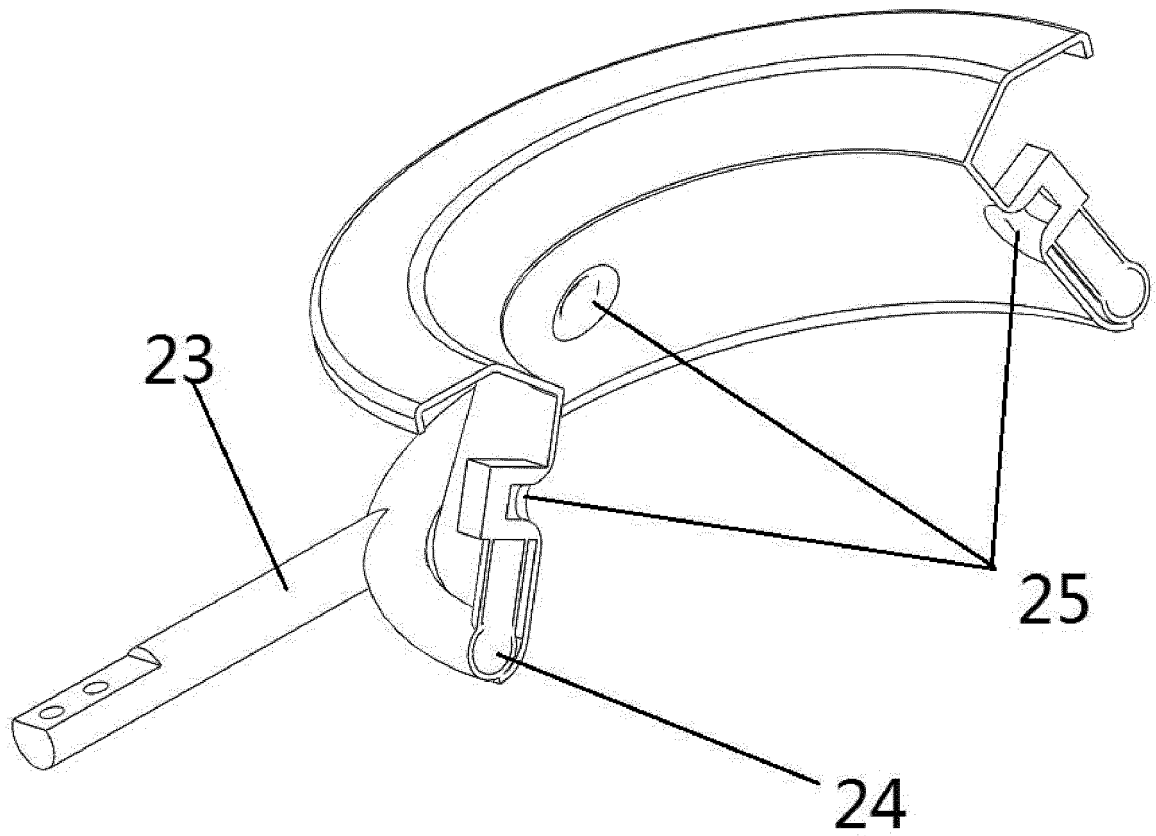


Figure 3

INTERNATIONAL SEARCH REPORT

International application No.

PCT/CN2016/075425

A. CLASSIFICATION OF SUBJECT MATTER

D06B 3/28 (2006.01) i

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)

D06B

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)

CNABS, CNTXT, CNKI, WPI, EPODOC: textile, cloth steaming, steam, swinging-bucket, cloth swinging, antifolding, cropping, fabric?, cloth+, spray+, oscill+, flirt+, swing+, sway+, flick+, fold???, muzzle?, nozzle?, injector?, wrinkle

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
E	CN 205242064 U (FONG'S NATIONAL ENGINEERING (SHENZHEN) CO., LTD.), 18 May 2016 (18.05.2016), claims 1-10	1-8
Y	CN 201390884 Y (ZHEJIANG ZHUOXIN MACHINERY CO., LTD.), 27 January 2010 (27.01.2010), description, particular embodiments, and figure 1	1-10
Y	CN 103966785 A (LIU, Feng), 06 August 2014 (06.08.2014), description, paragraphs [0006]-[0017], and figure 1	1-10
Y	CN 102644170 A (JINAN YUANSHOU KNITTING CO., LTD.), 22 August 2012 (22.08.2012) description, particular embodiments, and figures 1 and 2	1-10
A	CN 102080318 A (GUANGZHOU PANYU GOFRONT DYEING AND FINISHING MACHINERY MANUFACTURER LTD.), 01 June 2011 (01.06.2011), the whole document	1-10
A	DE 19813477 C2 (THEN MASCHINEN UND APPBAU GMBH), 08 November 2001 (08.11.2001), the whole document	1-10

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

* Special categories of cited documents:	"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
"A" document defining the general state of the art which is not considered to be of particular relevance	"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
"E" earlier application or patent but published on or after the international filing date	"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
"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)	"&" document member of the same patent family
"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	

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Name and mailing address of the ISA/CN:
State Intellectual Property Office of the P. R. China
No. 6, Xitucheng Road, Jimenqiao
Haidian District, Beijing 100088, China
Facsimile No.: (86-10) 62019451

Authorized officer

SHAO, Suxiu

Telephone No.: (86-10) 62084497

INTERNATIONAL SEARCH REPORT

International application No.

PCT/CN2016/075425

C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT		
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	EP0193945 A2 (BABCOCK TEXTILMASCH), 10 September 1986 (10.09.1986), the whole document	1-10

Form PCT/ISA/210 (continuation of second sheet) (July 2009)

INTERNATIONAL SEARCH REPORT
Information on patent family members

International application No.

PCT/CN2016/075425

Patent Documents referred in the Report	Publication Date	Patent Family	Publication Date
CN 205242064 U	18 May 2016	None	
CN 201390884 Y	27 January 2010	None	
CN 103966785 A	06 August 2014	CN 103966785 B	25 November 2015
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		EP 0193945 B1	13 May 1992
		DE 3508062 A1	11 September 1986

Form PCT/ISA/210 (patent family annex) (July 2009)