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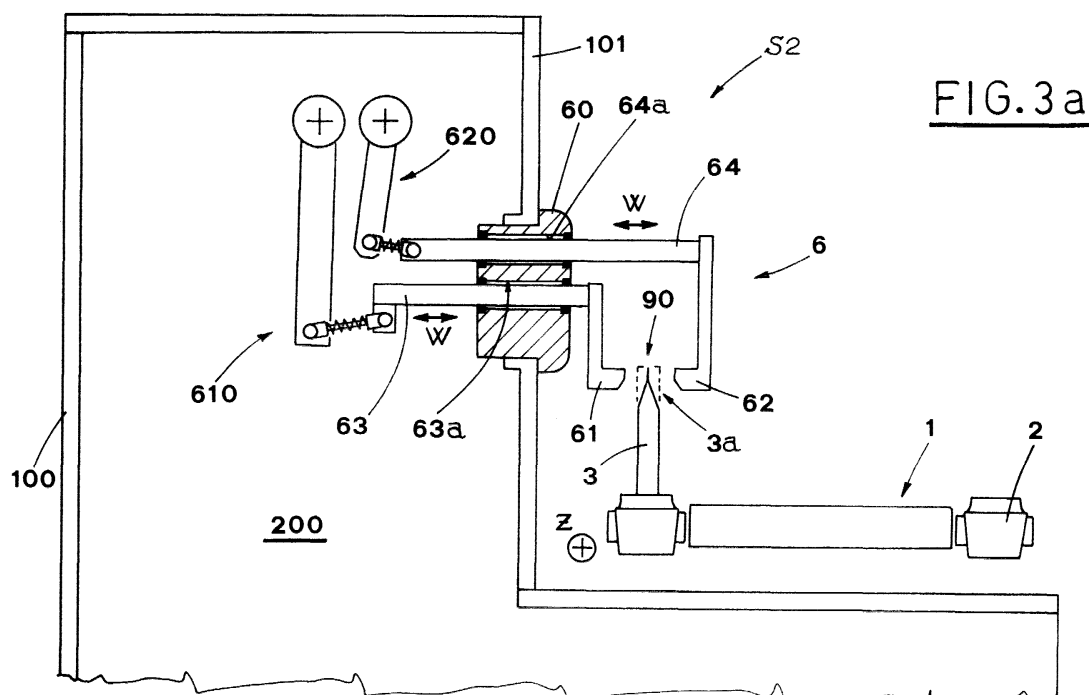
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(54) **Station for closing containers, in particular tubes, in a tube filling and closing machine**

(57) A station (S2) for closing containers, in particular tubes (3) with open bottoms (3a), in a tube filling and closing machine, which includes a conveying line (1) with holding means (2) which receive said tubes (3) situated upturned and with the axis substantially vertical. Product dispensing means (5) are situated upstream of the station (S2) for filling the tubes (3) with product. The station (S2) is equipped with means (6) which close

the bottoms (3a) of the tubes (3) and operate at a process area (90). The closing means (6) are carried by stems, which freely pass through a wall (101) of a compartment (200), which is situated on the opposite side with respect to the closing means (6) and which is aimed at containing the operating means (610, 620) of the stems. The compartment (200) is hermetically separated from the process area (90).



Description

[0001] The present invention relates to closing containers known as tubes, traditionally obtained from aluminium or synthetic material.

[0002] More precisely, the present invention relates to a station for closing tubes containing paste products, e.g. for pharmaceutical and/or alimentary use, in a tube filling and closing machine.

[0003] The closing stations are in fact associated to tube filling and closing machine which fill and close the treated tubes.

[0004] According to known techniques, the tubes shape is substantially cylindrical, with open bottom and equipped with a closing cap, previously sealed to the head.

[0005] Thus, the tubes are fed to the machine line with the open bottom turned upwards, to allow suitable dispensing means, situated in a feeding station, to fill the tubes with the desired product.

[0006] Then, the tube is closed and sealed in subsequent closing stations, thus taking the well known shape, and, when needed, it is subjected to additional treatments, such as printing and/or codifying, before final closing.

[0007] The fixed arrangement of the tubes on the machine line, with the open bottoms turned upwards, increases the risk of contamination due to traces of oils or lubricating greases released by machine operative means, situated above.

[0008] This gives rise to a high risk of contamination of the substances contained inside the tubes, thus compromising the quality of the packaged product.

[0009] This problem becomes intolerable in all cases when a sterile environment is required during the introduction of the product into the corresponding open tubes, in particular in case of pharmaceutical products, e.g. creams and ointments.

[0010] Another disadvantage results from the fact that the contaminating substances released by the machine mechanical means can not only penetrate into the tubes, but can also soil their outer surface.

[0011] Thus, the correct execution of possible additional treatments of codifying and/or printing on the outer surface of the tubes after their closure, cannot be guaranteed, and extreme confusion can be created about the main characteristics of the product, reported in the codes and/or prints (composition, dosage, contraindications, expiry date of the product, etc.).

[0012] The object of the present invention is to propose a station for closing containers, in particular tubes, in a tube filling and closing machine, which outweighs the above mentioned disadvantages, and which allows to close said containers in environments made and maintained sterile, thus reducing to the minimum the risks of contamination by undesired substances.

[0013] Another object of the present invention is to propose a closing station, which ensures high reliability

and productivity standards in any operation conditions, and which can be adapted to different tubes sizes without changing the operation of the whole working group.

[0014] A further object of the present invention is to propose a closing station obtained by a simple, extremely functional and reliable technical solution, which ensures a correct closing of the tubes.

[0015] The above mentioned objects are achieved by the features of the independent claim, while preferred features are defined in the dependent claims.

[0016] The invention will now be described in more detail with reference to particular, non-limiting embodiments and with reference to the accompanying drawings, in which:

- Figure 1 is a schematic lateral view of a tube filling and closing machine, equipped with the proposed closing station;
- Figure 2 is a schematic top view of the machine of Figure 1;
- Figures 3a, 3b are enlarged views of two embodiments of the proposed closing station, in partial sections taken along the plane III-III indicated in Figures 1, 2.

[0017] With reference to the above drawings, the reference sign M indicates a tube filling and closing machine, equipped with the proposed closing station S2.

[0018] The machine M includes a conveying line 1, extending like a close loop on a substantially horizontal plane and equipped with holding means 2, regularly spaced apart by a predetermined distance for supporting tubes 3.

[0019] The tubes 3, with their bottoms 3a open, are arranged upturned on the holding means, with their axes substantially vertical.

[0020] The tubes 3 are picked up in a predetermined pick up area, and introduced into the conveying line 1 by suitable known transferring means, situated in a loading station S1.

[0021] According to a preferred embodiment, the conveying line 1 follows a substantially oval path and is operated stepwise in clockwise direction, with an e.g. two-tube step, i.e. double with respect to the rate defined for the holding means 2.

[0022] Thus, the conveying line 1 conveys the tubes 3 from the loading station S1 to a feeding station SA, where product dispensing means 5 fill each tube 3 with a properly measured quantity of paste product, through the open bottom 3a.

[0023] At least one closing station S2, situated downstream of the feeding station SA, includes means 6, preferably pliers, which close the bottoms 3a of the tubes 3.

[0024] For this purpose the tube filling and closing machine M can be equipped with a plurality of closing sta-

tions S2: the number of stations which are activated depends strictly on the type of material to be introduced into the tubes 3 and on the closing techniques.

[0025] Thus, it is possible to simplify considerably the operative means 6 of each closing station S2, by separating the basic operative steps of the complete cycle of the tubes 3 closing operation.

[0026] The closing stations S2 are arranged along a straight part 1a of the conveying line 1 and are aligned therewith.

[0027] At least one closing station S2 can be equipped with known devices for applying a code to the tubes 3.

[0028] Downstream of the closing stations S2, the tube filling and closing machine M includes a discharge station S3, where the tubes 3 are picked up from the conveying line 1 and placed in an outlet line 7, by suitable transferring means, e.g. similar to the previously mentioned discharge station S1.

[0029] The structure 100 of the machine M of the closing stations S2 area is advantageously shaped like a shoulder.

[0030] The closing means 6, of pliers type, are overhanging, so as to reduce the number of mechanical elements which must work in the process area 90 over the tubes 3, during the closing thereof.

[0031] The means for operating the pliers means 6 are situated inside a compartment 200 formed by the structure 100, commonly known to those skilled in the art as "gray area".

[0032] According to a first embodiment of the proposed closing station S2, shown in Figure 3a, the closing means 6, of pliers type, include a pair of jaws, first 61 and second 62, opposite to each other, aimed at working in the process area 90 to close the tubes 3.

[0033] The first jaw 61 and the second jaw 62 are moved alternately in a horizontal direction W, substantially crosswise to the forward movement direction Z of the conveying line 1, in correspondence to the closing stations S2.

[0034] The first jaw 61 and the second jaw 62 are integral with respective horizontal stems, first 63 and second 64, which partially protrude, overhanging, from a drum 60 fastened to a vertical wall 101 of the structure 100, near the compartment 200.

[0035] The first stem 63 and the second stem 64 are slidably guided inside through guiding seats, first 63a and second 64a, which are substantially horizontal and formed by the drum 60 by corresponding sleeves e.g. self-lubricating.

[0036] The first stem 63 and the second stem 64 extend inside the compartment 200 formed by the "shoulder" part of the structure 100, where they are connected to respective linkages, first 610 and second 620.

[0037] First linkage 610 and second linkage 620 are operated by motor means of the tube filling and closing machine M to set the first stem 63 and the second stem 64 in predetermined axial movement in direction W, in

one or the other sense.

[0038] As it can be easily understood from Figure 3a, the first stem 63 and the second stem 64 are parallel to each other and are guided in their through seats first 63a and second 64a.

[0039] In this case, the first stem 63, connected to the first jaw 61, is situated at the lower level with respect to the second stem 64.

[0040] The second stem 64 is longer than the first stem 63 and is connected to the second jaw 62.

[0041] According to a second embodiment, shown in Figure 3b, the stems, first 630 and second 640, are mounted in coaxial relation.

[0042] The second stem 640 is longer than the first stem 630 and is slidably guided inside a channel 650, formed by the first tubular stem 630 and coaxial therewith.

[0043] According to both embodiments, the linkages, first 610 and second 620, move synchronously the respective stems, first 63, 630 and second 64, 640, so as to allow the corresponding jaws, first 61 and second 62, to close correctly the bottoms 3a of the tubes 3.

[0044] It is obvious that the above described closing station S2, according to the two proposed embodiments, allows to keep all the mechanical means requiring lubricating inside the compartment 200 of the structure 100, while the sleeves, inside which the stems slide, are self-lubricating.

[0045] For creating a tightness, the stems can be equipped with oil seals of commercial type.

[0046] Thus, the shape of each closing station S2 allows to reduce, practically eliminate, the risk of contamination of the product inside the tubes 3 by contaminating substances, e.g. lubricating, during the tubes closing.

[0047] This is possible largely due to the fact that the linkages, first 610 and second 620 of the pliers means 6, which are main sources of contamination, are placed inside the compartment 200, hermetically separated from the process area 90, where the substantially overhanging jaws, first 61 and second 62, operate.

[0048] Consequently, the closing means 6 work in a process area 90 which can be easily "atmosphere controlled", substantially aseptic, by e.g. means creating a laminar flow, preferably downwards.

[0049] The above mentioned advantages are obtained by a closing station which assures high reliability and productivity standards in any working conditions and which can be adapted to different tubes shapes: for this purpose it is enough to disengage the pair of jaws, first 61 and second 62, from relative stems, first 63, 630 and second 64, 640 and substitute them with other jaws 61, 62, corresponding to the new shape of the tubes 3.

[0050] Actually, the proposed closing station is extremely functional and reliable and ensures a particularly easy and rapid closing of the tubes.

[0051] It is also to be pointed out that the elements of the above described closing station are few and simple,

which reduce the production costs.

for creating nearby a substantially aseptic, germ-free area.

Claims

1. Station for closing containers, in particular tubes with the bottoms open, in a tube filling and closing machine which includes: a conveying line (1) equipped with holding means (2) which take said tubes (3) situated upturned and with the axis substantially vertical; a feeding station (SA), situated upstream of said station (S2) and equipped with product dispensing means (5) for filling said tubes (3) with products; said station (S2) being equipped with means (6) which close the bottoms (3a) of said tubes (3) at a process area (90); **characterized in that** said closing means (6) are carried by stems, which freely pass through a wall (101) of a compartment (200), said compartment (200) being hermetically separated from said process area (90) and situated on the opposite side -with respect to the closing means (6) and being aimed at containing the operating means (610, 620) of said stems.

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2. Station, according to claim 1, **characterized in that** said means (6) for closing said tubes (3) include pliers formed by a pair of jaws, namely a first jaw (61) and second jaw (62), opposite to each other and projecting from said first stem (63,630) and second stem (64,640), which are orthogonal to said wall (101) and partially protrude from a drum (60) integral with said wall (101) separating said process area (90) from said compartment (200), said first stem (63,630) and second stem (64,640), being operated to move axially by said operating means (610,620) situated in said compartment (200).

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3. Station, according to claim 2, **characterized in that** it includes, a first through holes (63a) and second through holes (64a), substantially parallel, made in the drum (60) and aimed at guiding slidably said first stem (63) and second stem (64), together with corresponding bushings.

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4. Station, according to claim 2, **characterized in that** said first stem (630) and second stem (640), are set in coaxial relation, with the second longer stem (640) being guided slidably, together with corresponding bushings, inside a channel (650), formed coaxially by the first stem (630), which is shorter and substantially tubular.

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5. Station, according to claim 3 or 4, **characterized in that** said sleeves guiding the first stem (63,630) and second stem (64,640) are self-lubricating.

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6. Station, according to claim 1 or 2, **characterized in that** it includes, in said process area (90), means

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7. Station, according to claim 2, **characterized in that** said first jaw (61) and second jaw (62), are removably fastened to the above mentioned first stem (63,630) and second stem (64,640).

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FIG.1

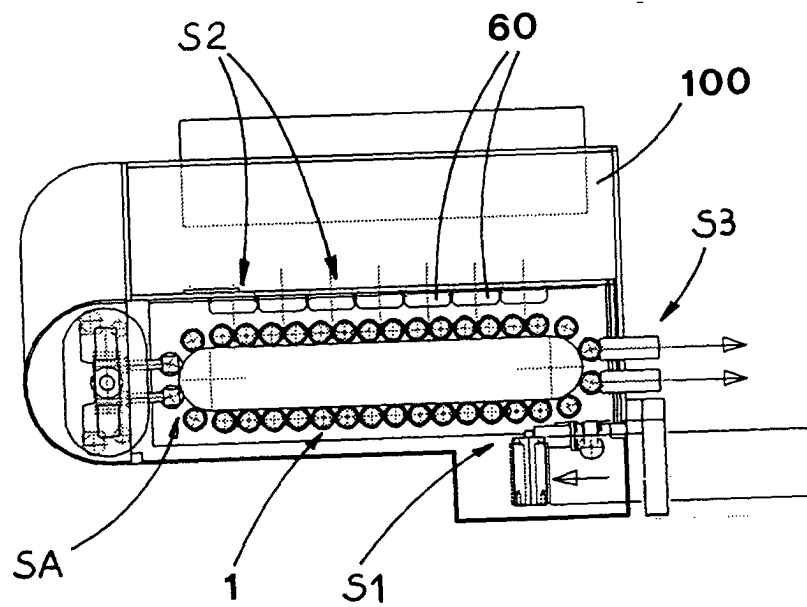
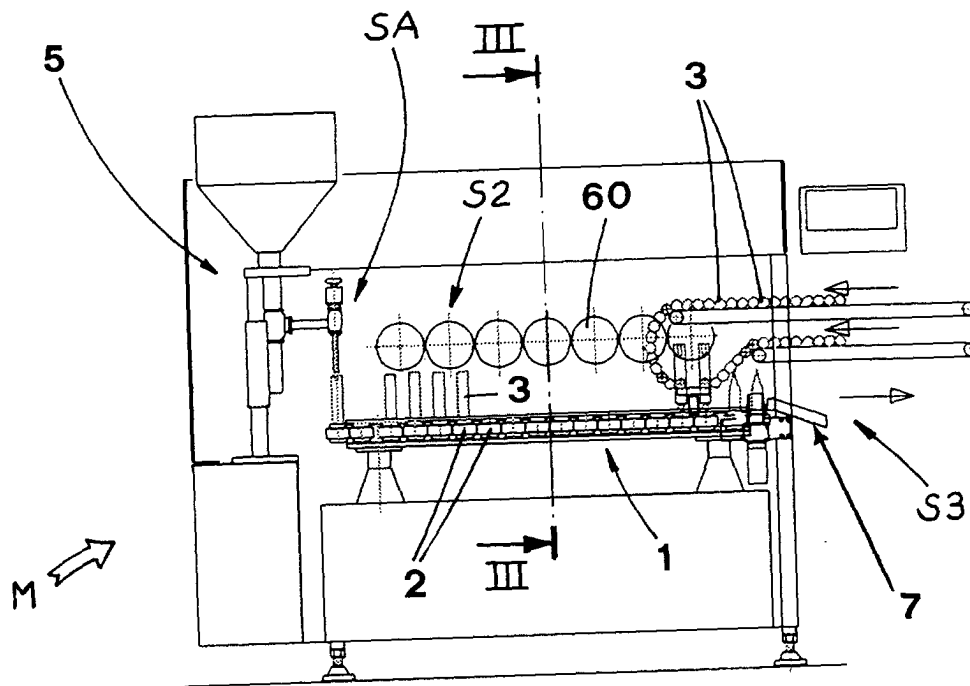
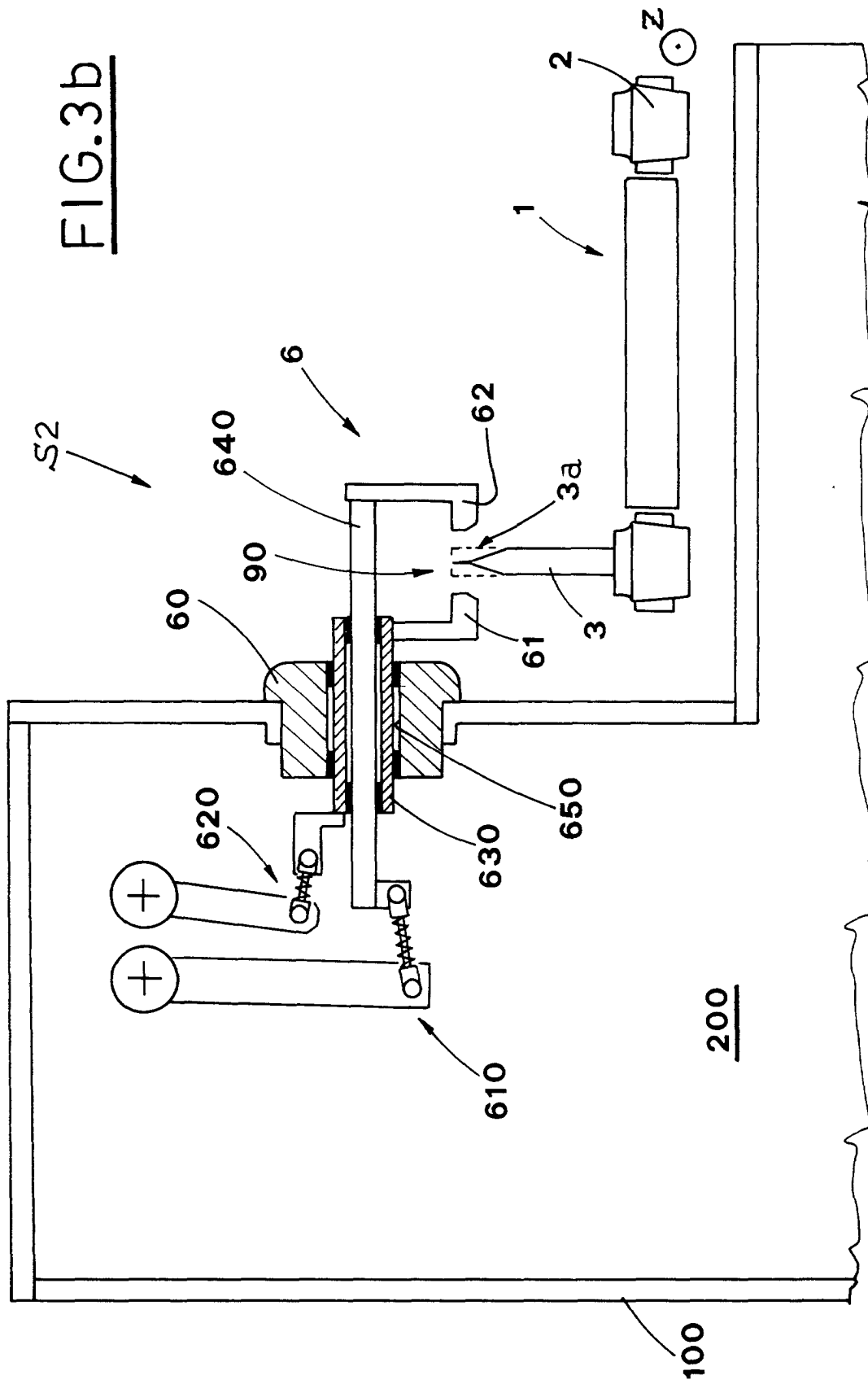


FIG.2





European Patent
Office

EUROPEAN SEARCH REPORT

Application Number
EP 01 11 5625

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int.Cl.7)
X	FR 1 326 506 A (M. BOMPAS) 14 August 1963 (1963-08-14) * page 2, column 1, line 9 - page 3, column 2, line 37; figures *	1-3	B65B7/14
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The present search report has been drawn up for all claims			
Place of search		Date of completion of the search	Examiner
THE HAGUE		19 October 2001	Jagusiak, A
CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document			

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**ANNEX TO THE EUROPEAN SEARCH REPORT
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EP 01 11 5625

This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report.
The members are as contained in the European Patent Office EDP file on
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