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(54) **Module for drying external surfaces of containers**

(57) A module (1) for drying outer surfaces of containers (2), comprising:

- a drying tunnel (3) having an entry (4) and an exit (5) and provided with nozzles (7) to blow air within the tunnel (3) onto the containers (2) transiting in the tunnel itself;
- means for transporting the containers (2) within the drying tunnel (3) from the entry (4) to the exit (5);

- means (6) for adjusting the nozzles (7) to vary their positioning.

is **characterised in that** the means (6) for adjusting the nozzles (7) comprise a transverse rod (12) where to are anchored the nozzles, the ends whereof are movable in height along vertical elements (13) in such a way that the rod can assume a plurality of positions, variously inclined and at various levels.

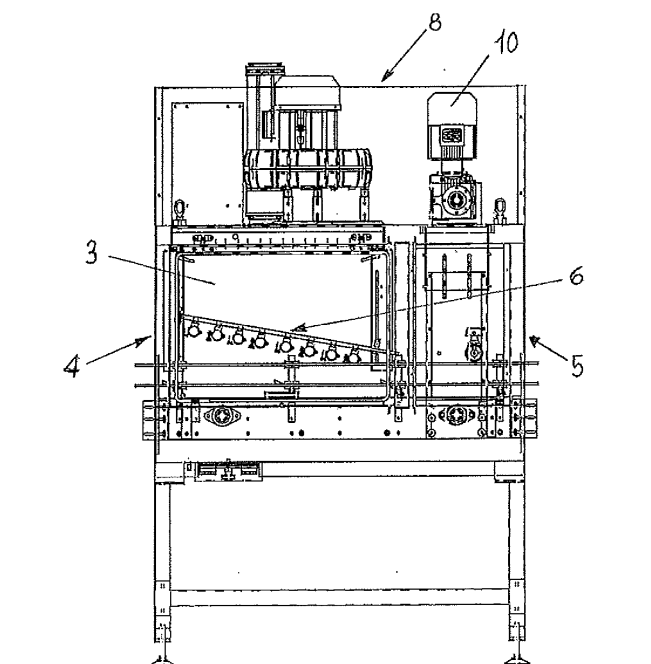


FIG. 5

Description

[0001] The present invention relates to an apparatus for drying external (i.e. outer) surfaces of containers comprising:

- a drying tunnel having an entry and an exit and provided with nozzles to blow air within the tunnel on the containers transiting in the tunnel itself;
- means for transporting the containers within the drying tunnel from the entry to the exit;
- means for adjusting the nozzles to vary their positioning.

[0002] The present invention is an improvement of the Italian patent application for industrial invention no. PR2006A000101 in the same Applicant's name, which protects the presence of a connecting conduit of the drying tunnel to a labelling machine, in which said conduit is provided with air conditioning means in such a way as to prevent condensation from forming on the outer surface of the dried containers.

[0003] In the present case, more than to the conduit, specific reference is made to the drying tunnel and to the means for adjusting the nozzles to vary its size according to the size of the treated containers.

[0004] These adjusting means comprise vertical rods whereon are slidably applied nozzles provided with joints for orientation.

[0005] This therefore entails the need for a manual adjustment not only of the joints, but also of the height of the nozzles on each rod, and since normally there are eight rods for each blowing element, up to eight vertical adjustments can take place.

[0006] An object of the present invention is to eliminate the aforesaid drawbacks and drastically to reduce the number of the adjustments necessary on the occasion of the change of format of the containers to be treated.

[0007] Most known applications comprise a drying tunnel constructed in a single module with a single blowing element and emission of air through a continuous blade-like lateral slit (instead of a plurality of nozzles): depending on the production needs and on the containers to be treated, during the design phase the use of a blowing element of adequate dimensions and power is prescribed.

[0008] An object of the present invention is to make the drying apparatus more flexible and more adaptable to the various circumstances and types of use, able also to transport the containers on paths of considerable lengths, even curvilinear and hence not only on short rectilinear segments.

[0009] Said objects are fully achieved by the drying module of the present invention, which is characterised by the content of the appended claims and in particular in that the means for adjusting the nozzles comprise a transverse rod whereon the nozzles are anchored, the ends of the rod being movable in height along vertical

elements in such a way that the rod can assume a plurality of positions variously inclined and at various levels.

[0010] The transport means can comprise a first conveyor belt whereon are input containers, and a second conveyor belt for outputting containers flanked for at least one segment to the first conveyor belt.

[0011] The transport means can comprise one or more conveyor belt shaped in such a way as to form a curvilinear path.

[0012] Individual modules, preferably provided each with its own blowing element, can be mutually connected to embody a longer apparatus.

[0013] This and other characteristics shall become more readily apparent from the description that follows of a preferred embodiment, illustrated purely by way of non limiting example in the accompanying drawing tables, in which:

- figures 1, 2 and 3 illustrate respectively some consecutive modules, respectively in a front view, a plan view and a longitudinal view along the direction of advance of the containers;
- figure 4 shows in greater detail a front view of a module;
- figures 4a and 4b illustrate some details of figure 4;
- figure 5 shows a front view of a module, complete with motorization for the conveyor belt;
- figures 6 and 7 show a module suitable for curvilinear paths.

[0014] With reference to figures, the number 1 indicates a module for drying the outer surface of containers 2 in a drying tunnel 3 having an entry 4 and an exit 5 and means 6 for adjusting a plurality of nozzles 7.

[0015] Each module 1 comprises a blowing element 8 which through a plurality of conduits 9 moves air through the nozzles and therefrom on the transiting containers.

[0016] Each module 1 normally comprises eight nozzles with related conduits, connected to a single blowing element.

[0017] Each module is about one meter long, and it can be replicated n times according to the speed, the dimensions of the container to be dried and the difference between the temperature of the product in the containers and the outside environment (which causes condensation to form).

[0018] Normally, there may be a single module, for application for example in wine bottling plants producing 1,000 bottles/hour, up to 12 modules in the case of industrial plants and typically breweries producing 60/70,000 bottles/hour.

[0019] To each blowing element 8 is originally associated an inverter for an adjustment of the speed of the blowing element, so that the blowing elements can be adjusted independently of each other.

[0020] Several modules are originally connected to each other by bolting or with pins to form as a whole a complete drying apparatus.

[0021] In one or more of said modules, shown in figure 5, there is a motorization 10 that provides for the actuation of a conveyor 11 of the containers, normally a conveyor belt or chain.

[0022] Since the length of the drying apparatus can be greater than that of a conveyor 11, it is possible that in one module 1 (but also in more than one module if necessary) a first conveyor, through which the containers enter the module, is flanked by a second conveyor through which the containers exit the module.

[0023] Within the module the containers transit from the first conveyor to the second conveyor.

[0024] Originally each module can be adapted to convey the containers, during the drying operation, along a path that is not rectilinear but curvilinear, as shown in figure 6.

[0025] In this case, the conveyor is constituted by a curvilinear segment of equal cross section relative to the rectilinear one. The conveyor has an average radius of 700 mm. Said conveyor is suitable for driving chains of any type. The curvilinear module has the same drying power as a rectilinear module L=1000mm of equal characteristics.

[0026] Differently from the prior art, the means 6 for adjusting the nozzles originally comprise a transverse rod 12 where to are anchored the nozzles 7, the ends whereof are movable in height along vertical elements 13 in such a way that the rod can assume a plurality of positions, variously inclined and at various levels.

[0027] In the case of the curvilinear path, the transverse rod 12 is curvilinear and it allows to house the same number of nozzles (sixteen) as the rectilinear module.

[0028] The system for locking the rod to the vertical elements 13 is of the hinge-carriage type: this enables to position the rod with any inclination relative to the horizontal plane, and the rotation of the rod itself relative to its axis.

[0029] The system for tightening the nozzles is constituted by bolting on the rod: this enables the rotation of the nozzle relative to the axis of the bolt. The two engagement systems, together, enable the rotation and the positioning of the nozzles on three axes.

[0030] To the transverse rod 12 are anchored with freedom of movement a plurality of elements 14 for supporting the nozzles 7.

[0031] Acting on said elements 14 it is possible to vary the orientation of the individual nozzles relative to the transiting containers, as in the prior art. Acting instead directly on the transverse rod, and in particular varying the inclination of said transverse rod and/or its level of height along the vertical elements 13, it is possible to vary the height of all the nozzles with a single, easy adjustment.

[0032] The inclination of the rod is such that the transiting containers meet first nozzles at greater height and subsequently nozzles at lower height, in such a way as to facilitate the process of drying and sliding the condensation from the top to the bottom of each container.

[0033] In the accompanying frontal drawings of the modules, the direction of advance of the containers is from left to right.

[0034] The last module of the apparatus, the one connecting with the labelling machine downstream, can be a dehumidification module as described in the aforementioned patent application by the same Applicant, or it can be a drying module like the other modules of the present invention, provided with nozzles and blowing element.

Claims

1. A module (1) for drying outer surfaces of containers (2), comprising:

- a drying tunnel (3) having an entry (4) and an exit (5) and provided with nozzles (6) to blow air within the tunnel (3) onto the containers (2) transiting in the tunnel itself;
- means for transporting the containers (2) within the drying tunnel (3) from the entry (4) to the exit (5);
- means for adjusting the nozzles (6) to vary their positioning.

characterised in that the means for adjusting the nozzles comprise a transverse rod where to are anchored the nozzles, the ends whereof are movable in height along vertical elements in such a way that the rod can assume a plurality of positions, variously inclined and at various levels.

2. A module as claimed in claim 1, wherein the transport means comprise a first conveyor belt whereon are input containers, and a second conveyor belt for outputting containers, flanked for at least one segment to the first conveyor belt.

3. A module as claimed in claim 1, wherein the transport means comprise one or more conveyor belt shaped in such a way as to form a curvilinear path.

4. An apparatus for drying the outer surface of containers, **characterised in that** it comprises a plurality of modules (1) as claimed in any of the previous claims, mutually connected by couplings, pins or bolting.

5. An apparatus as claimed in claim 4, wherein each module (1) comprises a blowing element (8).

6. An apparatus as claimed in claim 5, wherein to each blowing element (8) is associated an inverter for an adjustment of the speed of the blowing element, so that the blowing elements can be adjusted independently of each other.

7. An apparatus as claimed in claim 4, **characterised in that** it comprises a module for connecting to a labelling machine, provided with drying nozzles (7).
8. An apparatus as claimed in claim 4, **characterised in that** it comprises one or more modules (1) provided with motorization (10) for actuating a conveyor (11) of the containers (2).

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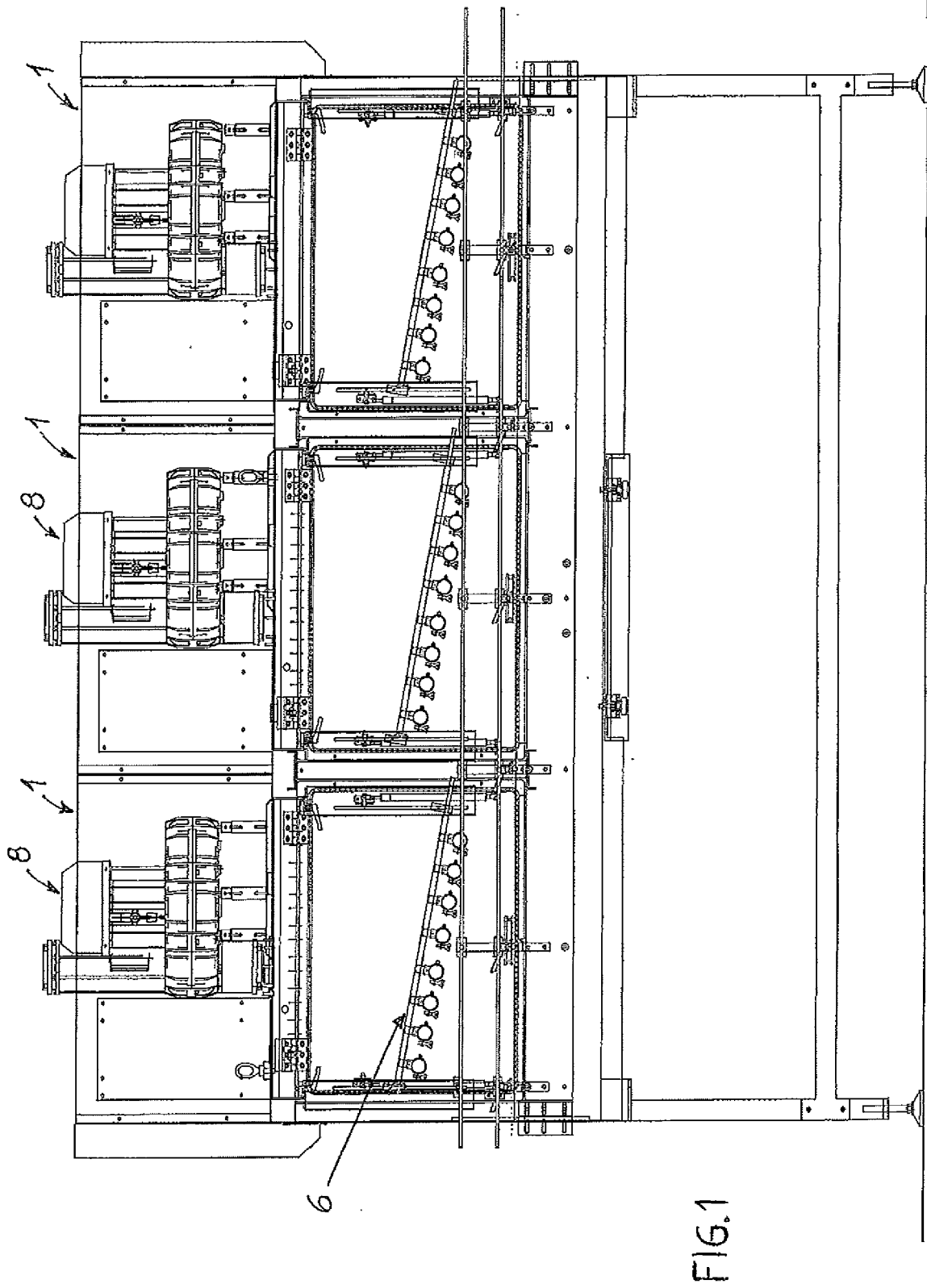
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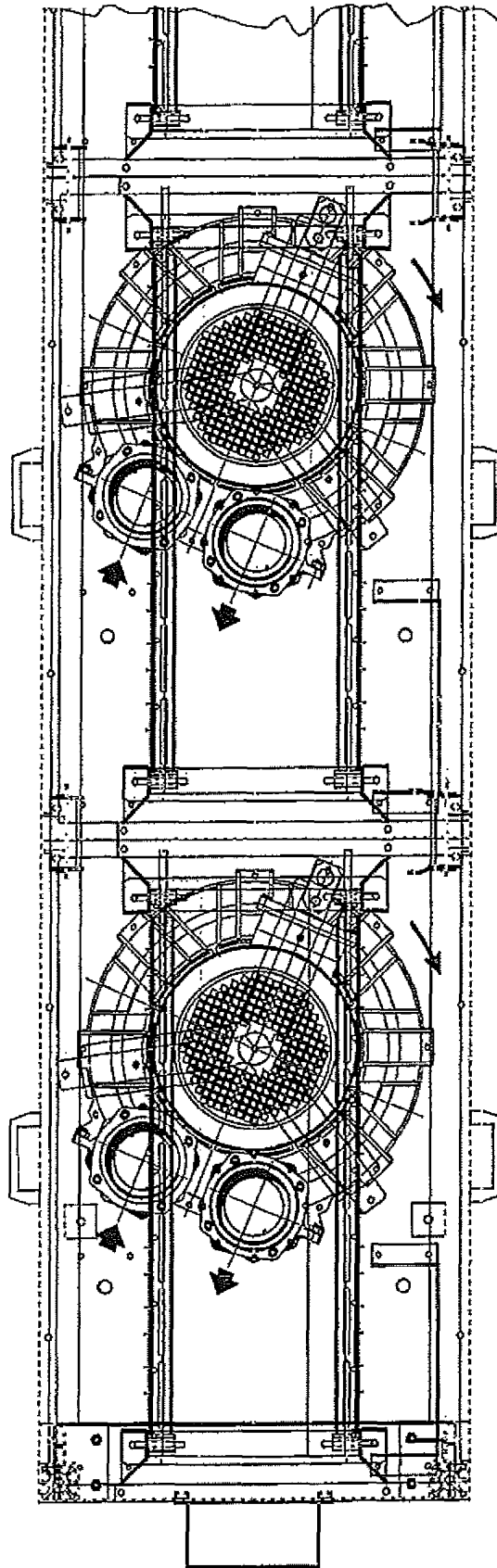
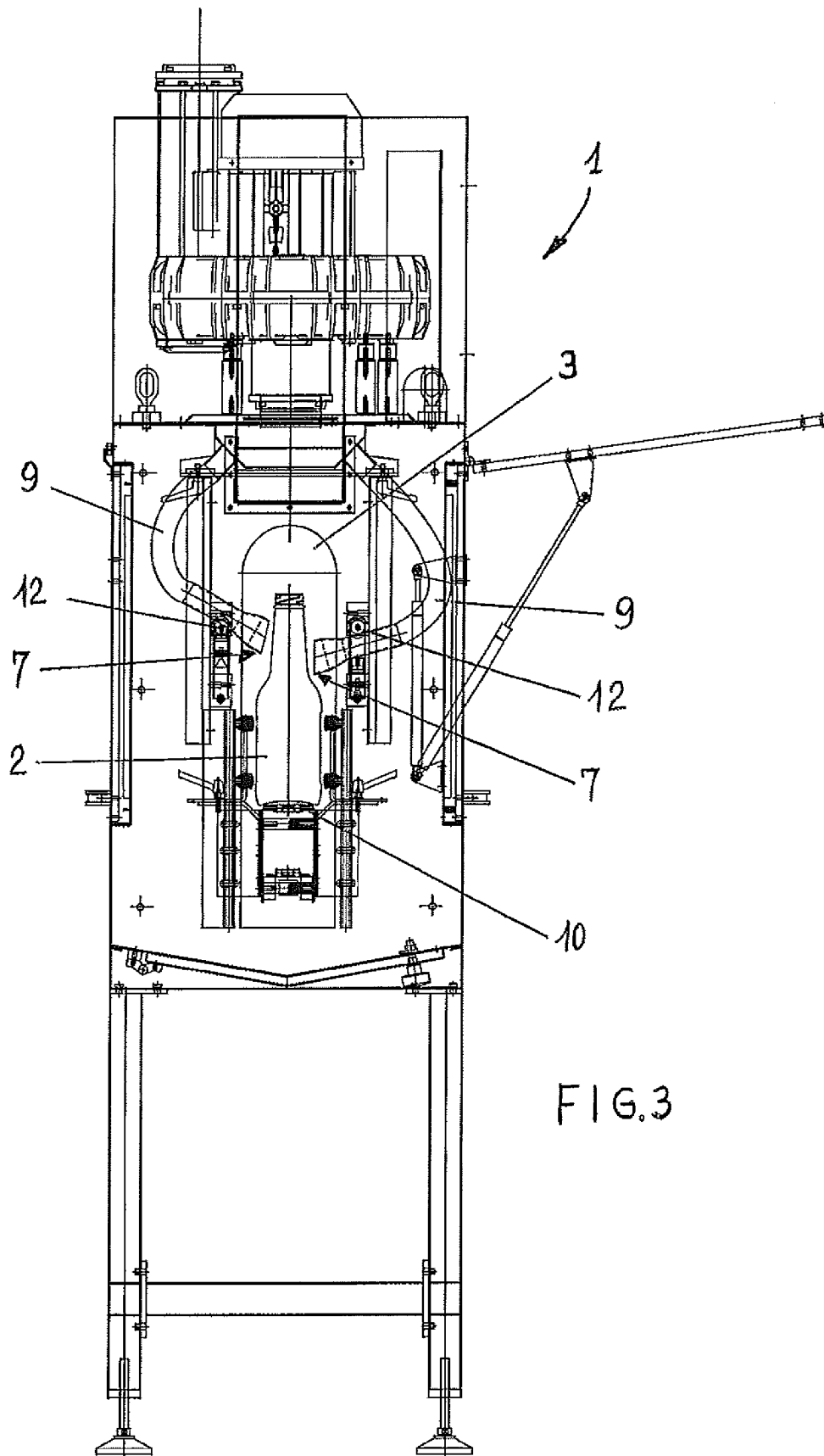
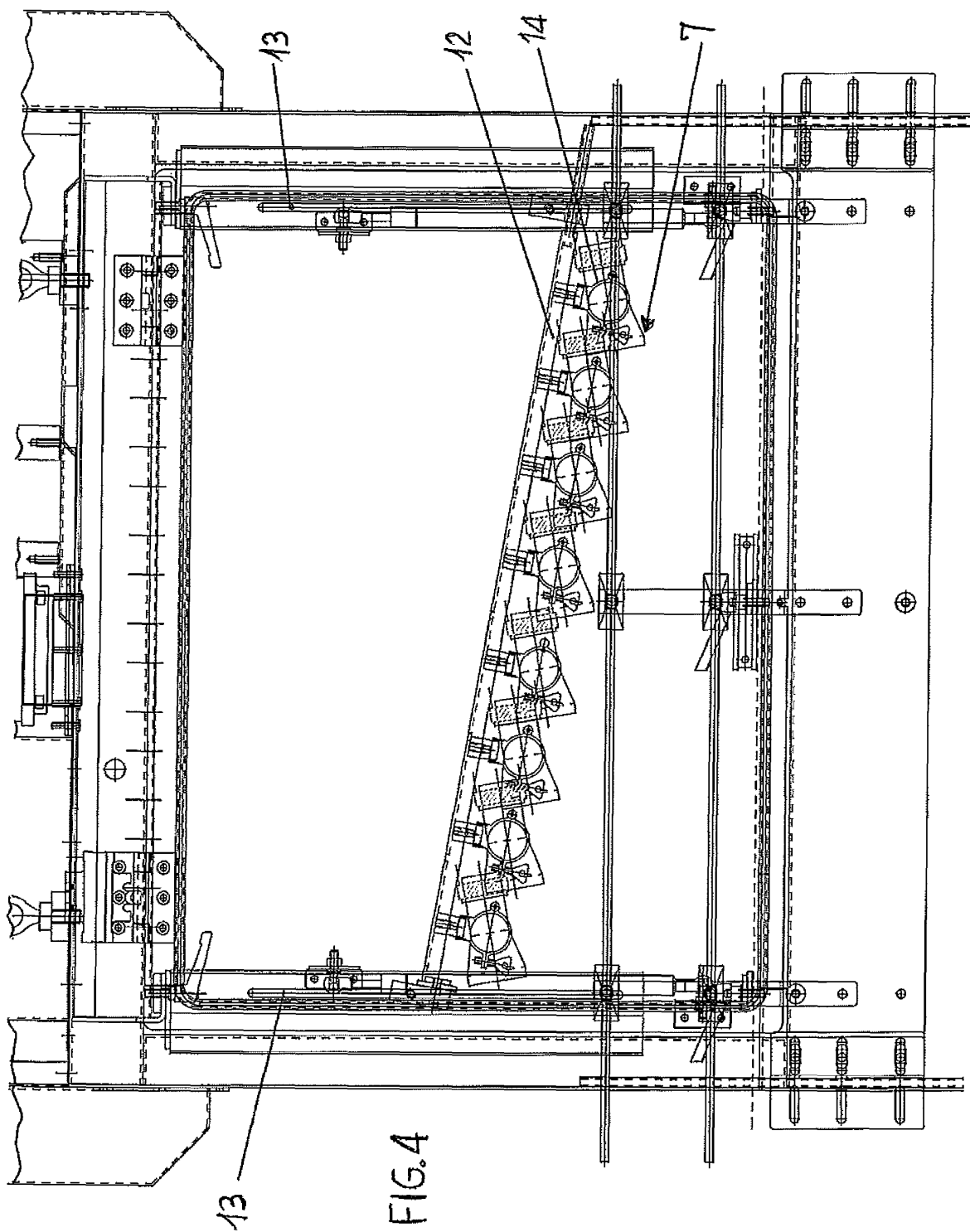


FIG. 2





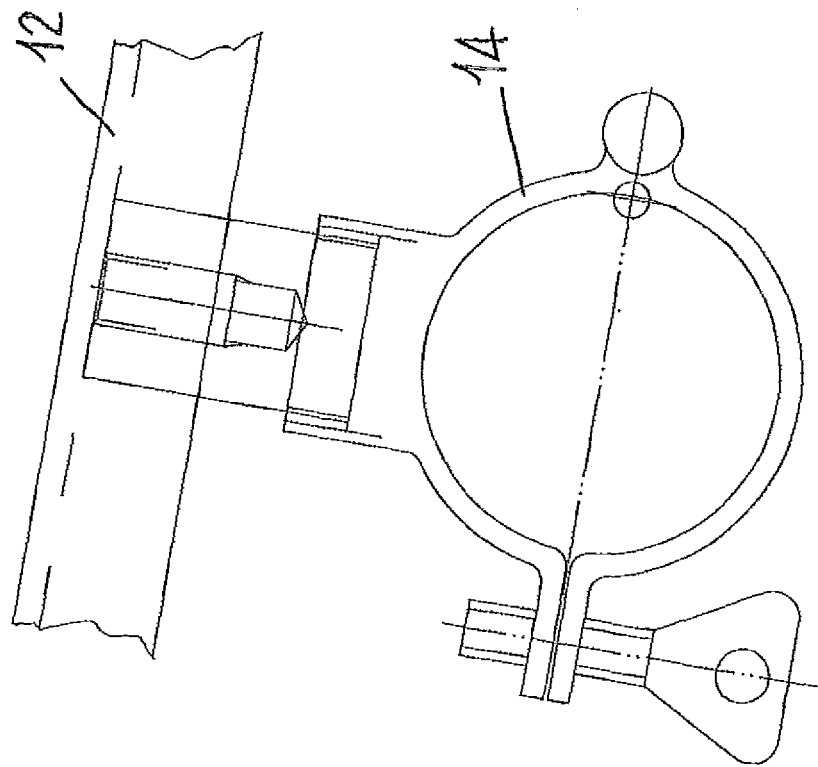


FIG. 4a

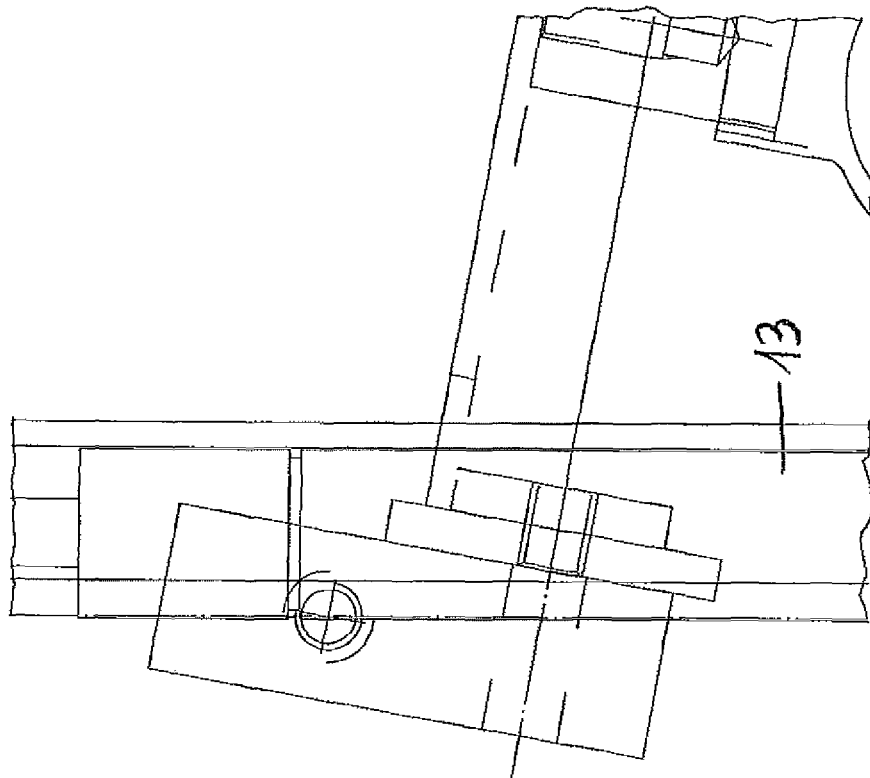


FIG. 4b

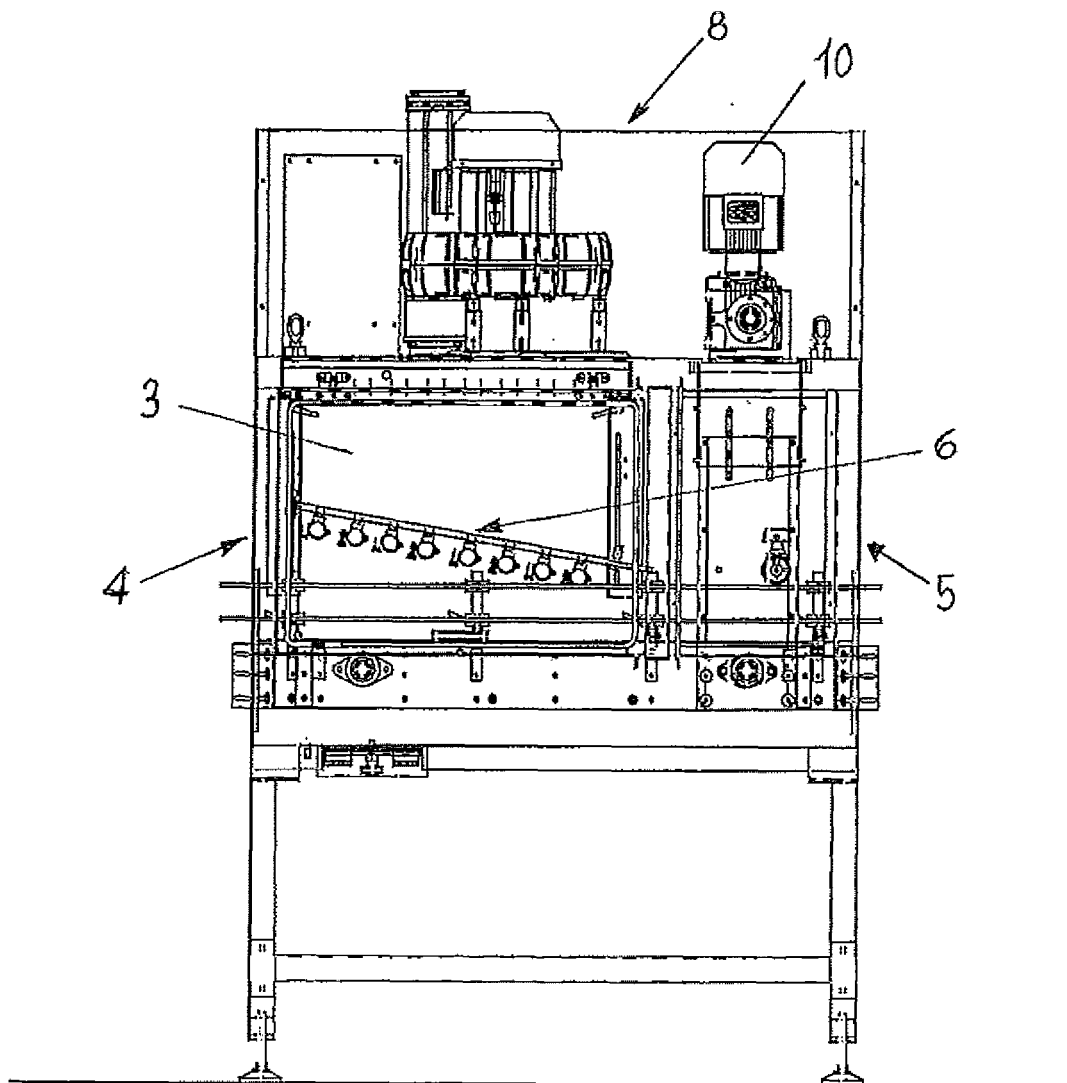
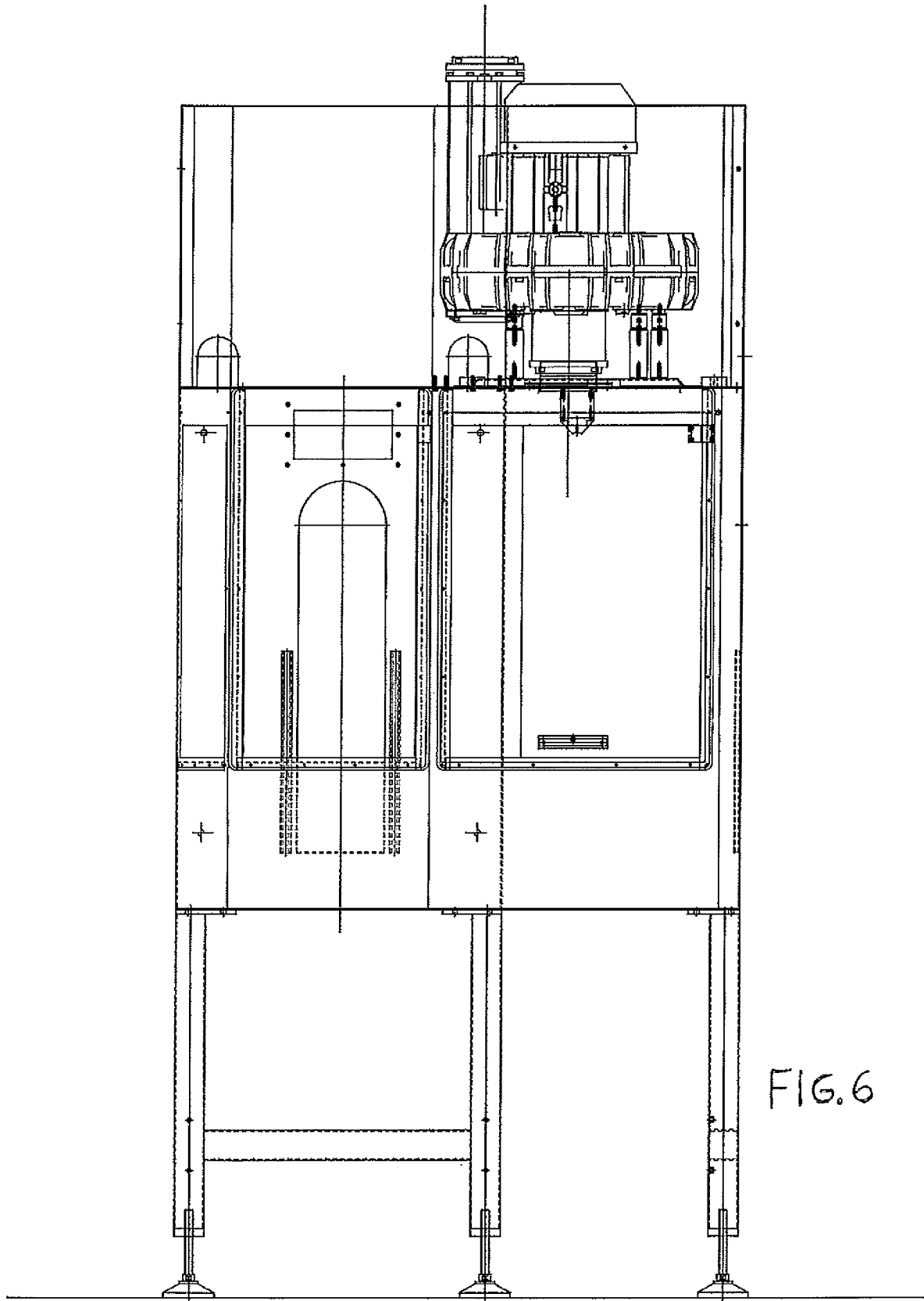


FIG. 5.



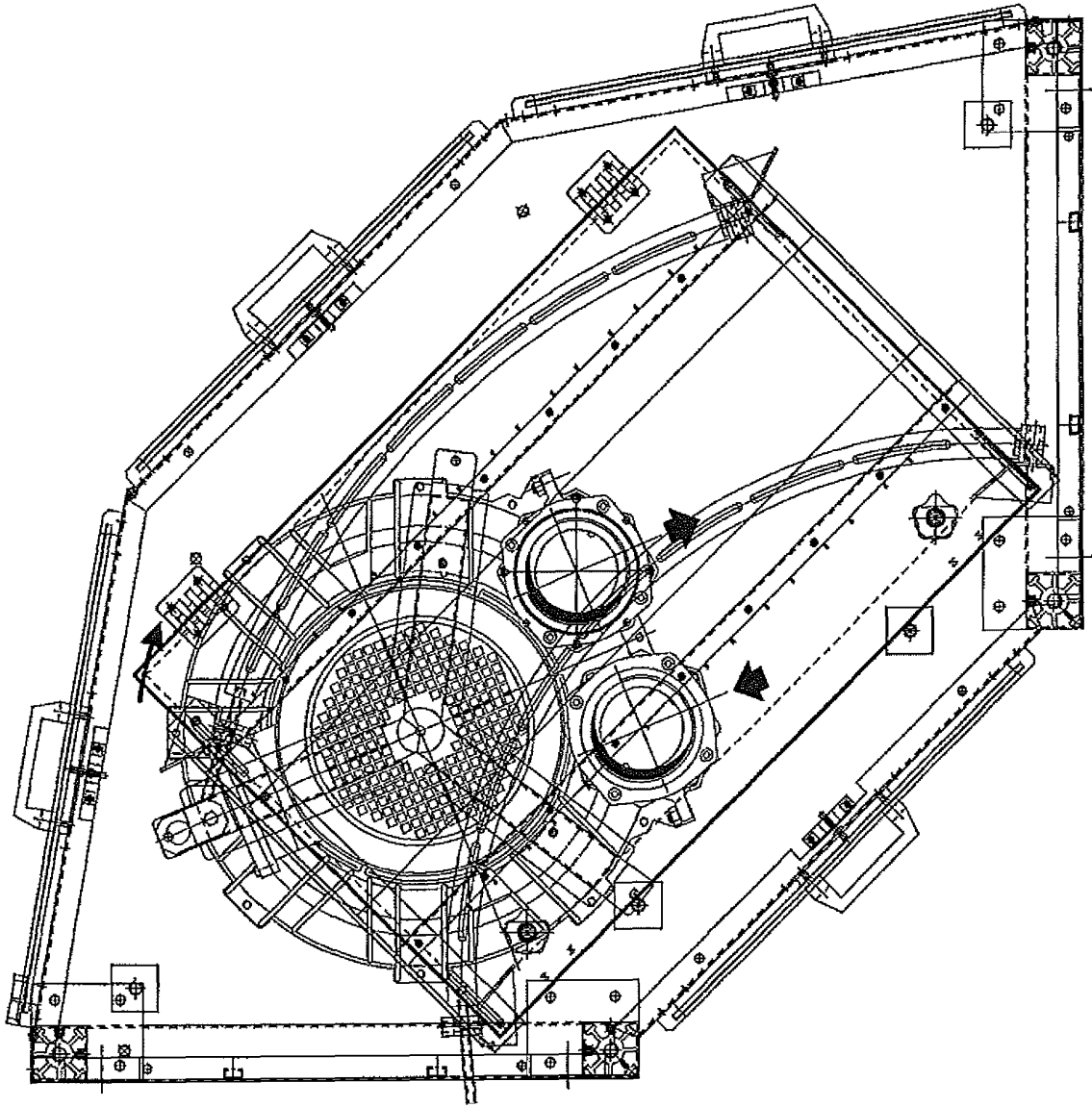


FIG. 7



EUROPEAN SEARCH REPORT

Application Number
EP 08 10 3767

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
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The present search report has been drawn up for all claims			TECHNICAL FIELDS SEARCHED (IPC)
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Place of search		Date of completion of the search	Examiner
The Hague		1 April 2009	Martínez Navarro, 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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For more details about this annex : see Official Journal of the European Patent Office, No. 12/82

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