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

Modul zum Trocknen der Außenflächen von Behältern

Module pour sécher des surfaces externes de conteneurs

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Description

[0001] The present invention relates to a module 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. IT PR20060101 A1 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 whereto 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 ore 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 respective 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). 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.

[0018] 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.

[0019] Several modules are originally connected to each other by bolting or with pins to form as a whole a complete drying apparatus.

[0020] In one or more of said modules, shown in figure

5, there is a motorization 10 that provides for the actuation of a conveyor of the containers, normally a conveyor belt or chain.

[0021] Since the length of the drying apparatus can be greater than that of a conveyor, 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.

[0022] Within the module the containers transit from the first conveyor to the second conveyor.

[0023] 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.

[0024] 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.

[0025] Differently from the prior art, the means 6 for adjusting the nozzles originally comprise a transverse rod 12 whereto 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.

[0026] 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.

[0027] 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.

[0028] 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.

[0029] To the transverse rod 12 are anchored with freedom of movement a plurality of elements 14 for supporting the nozzles 7.

[0030] 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.

[0031] 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.

[0032] In the accompanying frontal drawings of the modules, the direction of advance of the containers is from left to right.

[0033] 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 (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, **characterised in that** the means (6) for adjusting the nozzles (7) comprise a transverse rod (12) whereto are anchored the nozzles (7), the ends whereof are movable in height along vertical elements (13) in such a way that the rod (12) 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 (2), 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 (2), **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 of the containers (2).

Patentansprüche

1. Modul (1) zum Trocknen der Außenflächen von Behältern (2), umfassend:

   - einen Trocknungstunnel (3) mit einem Eingang (4) und einem Ausgang (5) und versehen mit Düsen (7), um im Tunnel (3) Luft auf die Behälter (2), die durch den Tunnel laufen, zu blasen;
   - Mittel, um die Behälter (2) im Trocknungstunnel (3) vom Eingang (4) zum Ausgang (5) zu transportieren;
   - Mittel (6) zum Einstellen der Düsen (7), um deren Positionierung zu ändern, **dadurch gekennzeichnet, dass** diese Mittel (6) zum Einstellen der Düsen (7) eine Querstange (12) umfassen, auf der die Düsen (7) befestigt sind, deren Enden entlang vertikaler Elemente (13) höhenverstellbar sind, sodass die Stange (12) eine Vielzahl von Positionen mit verschiedenen Neigungen und auf verschiedenen Höhen einnehmen kann.

2. Modul nach Anspruch 1, wobei die Transportmittel ein erstes Förderband umfassen, auf das die Behälter (2) eingegeben werden, und ein zweites Förderband für die Ausgabe der Behälter, das an mindestens einem Segment neben dem ersten Förderband angeordnet ist.

3. Modul nach Anspruch 1, wobei die Transportmittel ein oder mehrere Förderbänder umfassen, die so geformt sind, dass sie einen kurvenförmigen Weg bilden.

4. Vorrichtung zum Trocknen der Außenfläche von Behältern (2), **dadurch gekennzeichnet, dass** sie eine Vielzahl von Modulen (1) nach einem der vorhergehenden Ansprüche umfasst, die durch Kupplungen, Stifte oder Verschraubung miteinander verbunden sind.

5. Vorrichtung nach Anspruch 4, wobei jedes Modul (1) ein Blaselement (8) umfasst.

6. Vorrichtung nach Anspruch 5, wobei jedem Blaselement (8) ein Inverter für die Geschwindigkeitsregelung des Blaselements zugeordnet ist, sodass die Blaselemente unabhängig voneinander eingestellt werden können.

7. Vorrichtung nach Anspruch 4, **dadurch gekennzeichnet, dass** sie ein Modul für den Anschluss an eine Etikettiermaschine umfasst, versehen mit Trocknungsdüsen (7).

8. Vorrichtung nach Anspruch 4, **dadurch gekennzeichnet, dass** sie ein oder mehrere Module (1) umfasst, versehen mit Antrieb (10) zur Betätigung einer Förderung der Behälter (2).

Revendications

1. Module (1) pour sécher des surfaces externes de conteneurs (2), comprenant:

   - un tunnel de séchage (3) ayant une entrée (4) et une sortie (5) et pourvu de buses (7) pour souffler de l'air à l'intérieur du tunnel (3) sur les conteneurs (2) transitant par le tunnel lui-même;
   - des moyens de transport des conteneurs (2) à l'intérieur du tunnel de séchage (3) de l'entrée (4) à la sortie (5);
   - des moyens (6) pour régler les buses (7) afin de varier leur positionnement, **caractérisé en ce que** les moyens (6) pour régler les buses (7) comprennent une tige transversale (12) où sont fixées les buses (7), dont les extrémités peuvent se déplacer en hauteur le long d'éléments verticaux (13) de telle sorte que la tige (12) puisse avoir une pluralité de positions, variablement inclinées à différents niveaux.

2. Module selon la revendication 1, dans lequel les moyens de transport comprennent un premier tapis transporteur permettant l'entrée des conteneurs (2) et un second tapis transporteur pour la sortie de ces derniers, flanqué sur au moins un segment du premier tapis transporteur.

3. Module selon la revendication 1, dans lequel les moyens de transport comprennent un ou plusieurs tapis transporteur(s) façonné(s) de telle manière à ce qu'il(s) forme(nt) une trajectoire curviligne.

4. Appareil pour sécher la surface externe de conteneurs (2) **caractérisé en ce qu'**il comprend une pluralité de modules (1) selon l'une quelconque des revendications précédentes, mutuellement relié par des accouplements, des axes ou par boulonnage.

5. Appareil selon la revendication 4, dans lequel chaque module (1) comprend un élément de soufflage (8).

6. Appareil selon la revendication 5, dans lequel à chaque élément de soufflage (8) est associé à un onduleur permettant de régler la vitesse de l'élément de

soufflage, de telle sorte que les éléments de soufflage puissent être réglés indépendamment les uns des autres.

7. Appareil selon la revendication 4, **caractérisé en ce qu'**il comprend un module afin d'être relié à une machine d'étiquetage pourvue de buses de séchage (7).

8. Appareil selon la revendication 4, **caractérisé en ce qu'**il comprend un ou plusieurs modules (1) pourvu (s) d'une motorisation (10) pour actionner un transporteur de conteneurs (2).

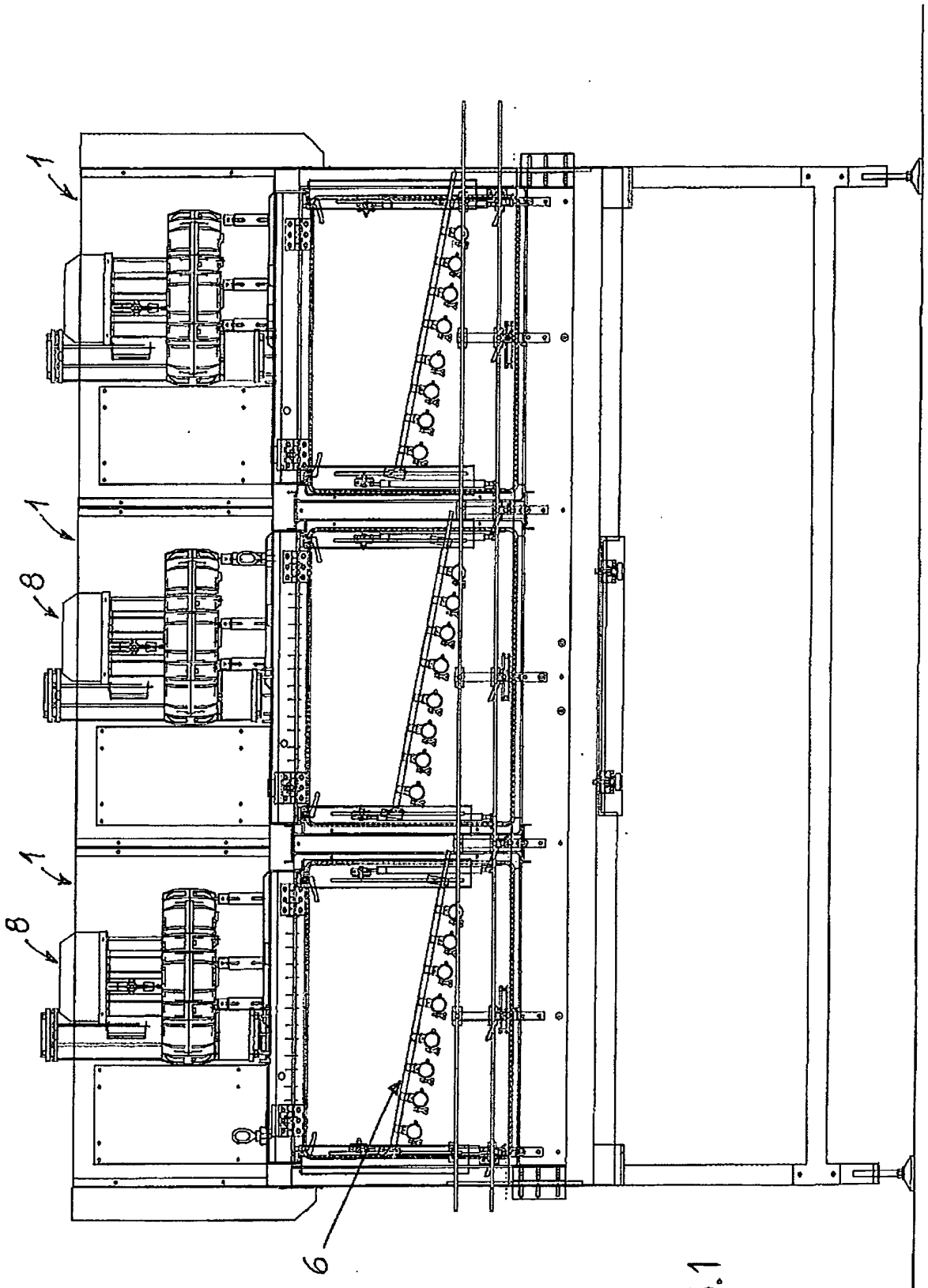

FIG.1

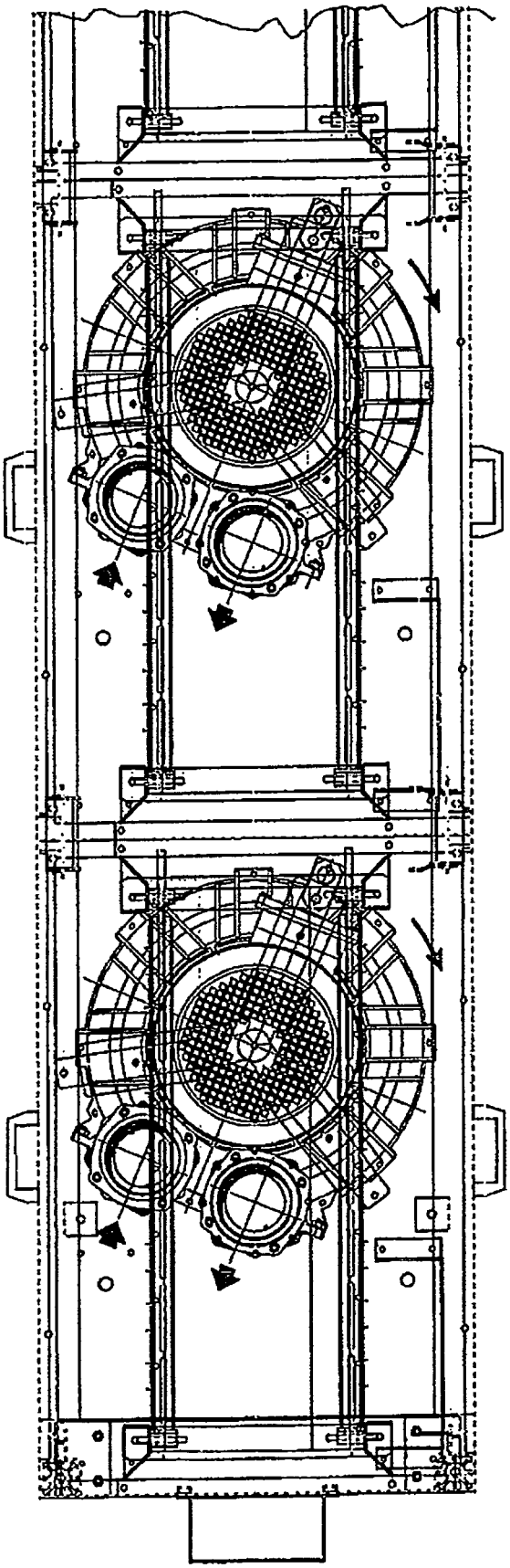

FIG. 2

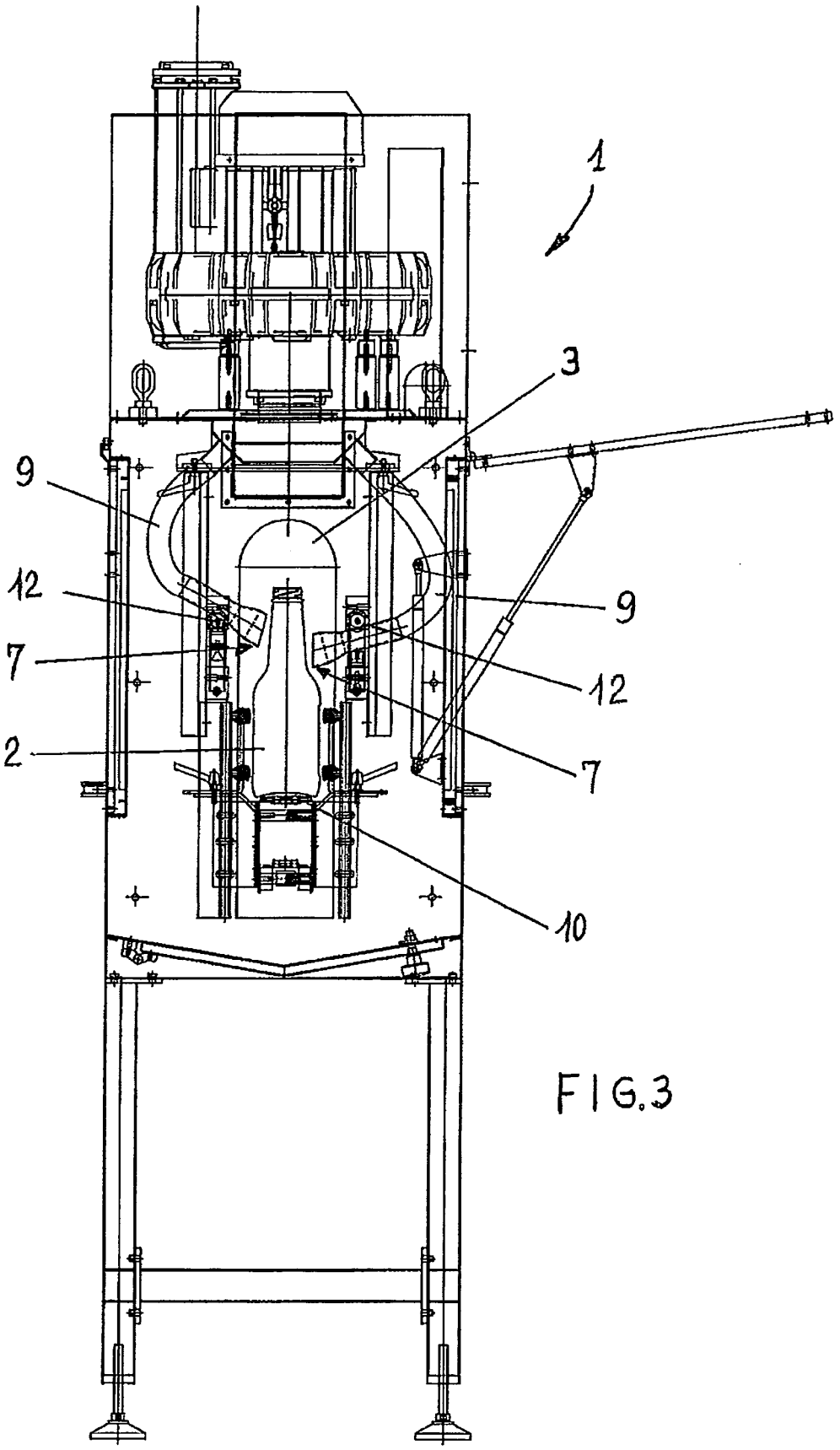

FIG.3

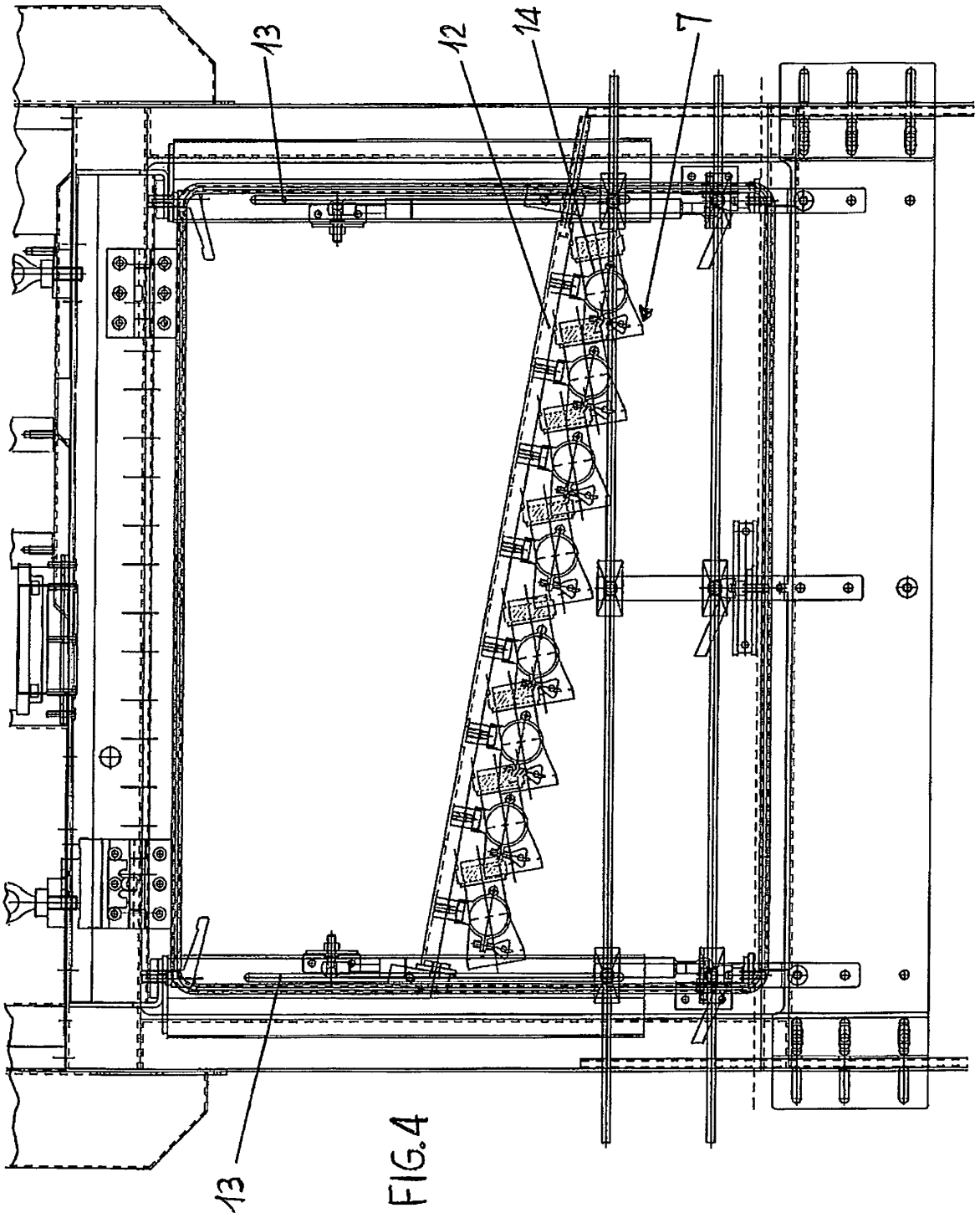

FIG.4

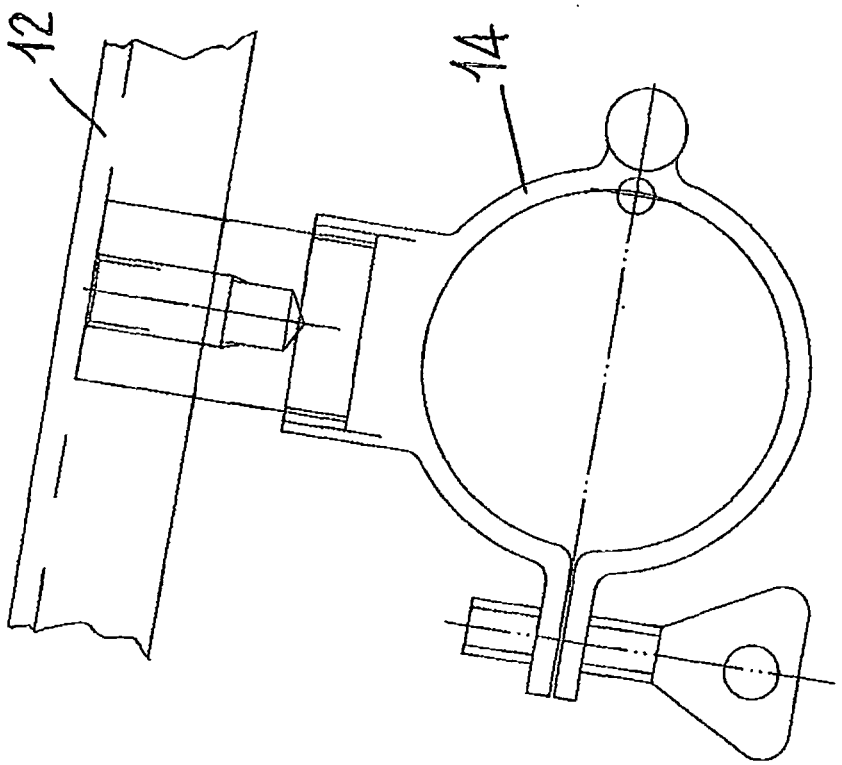

FIG.4b

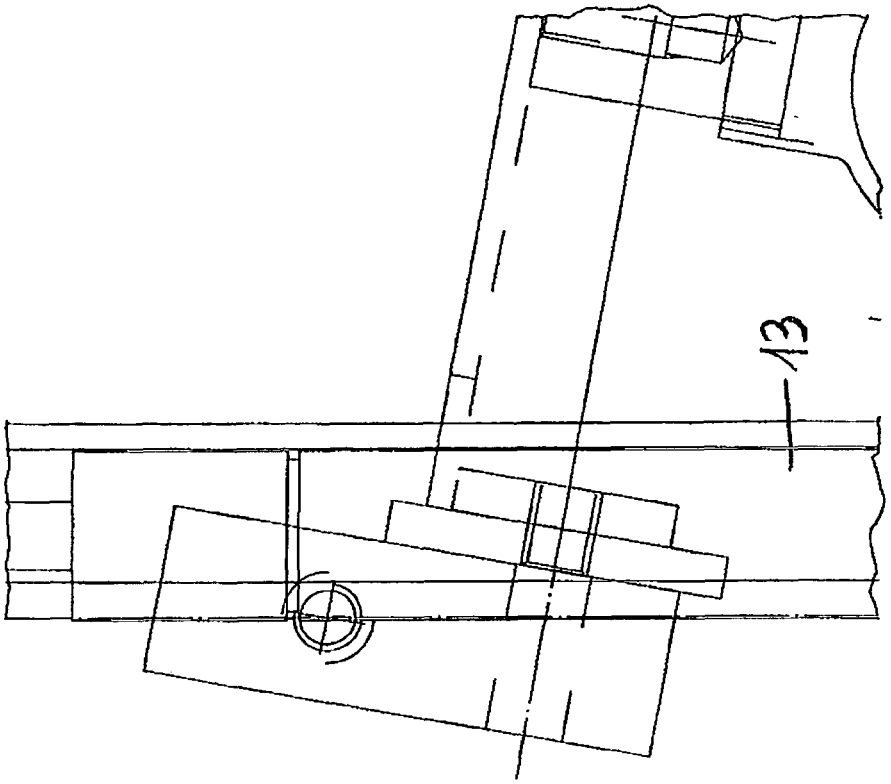

FIG.4a

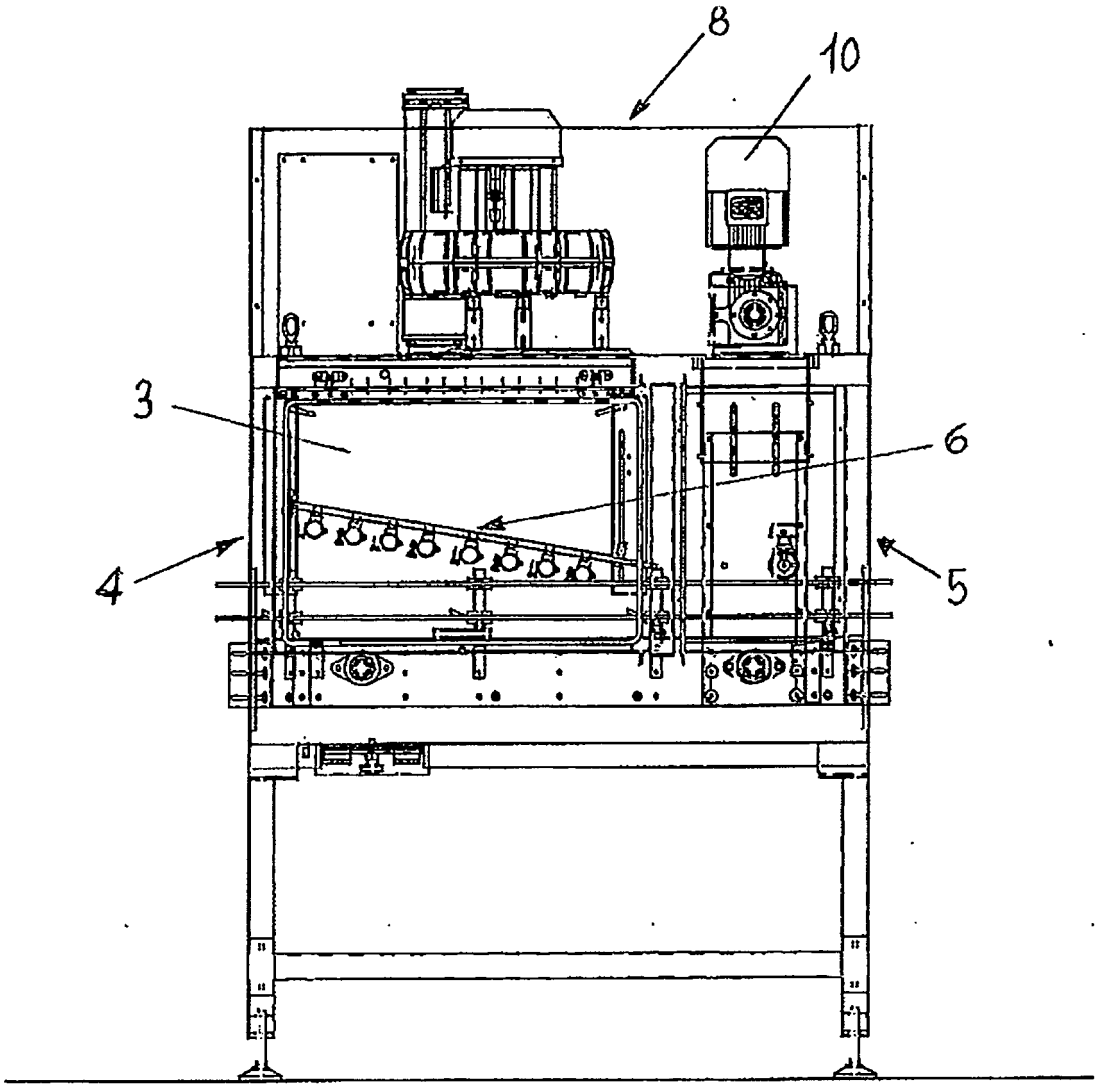

FIG. 5

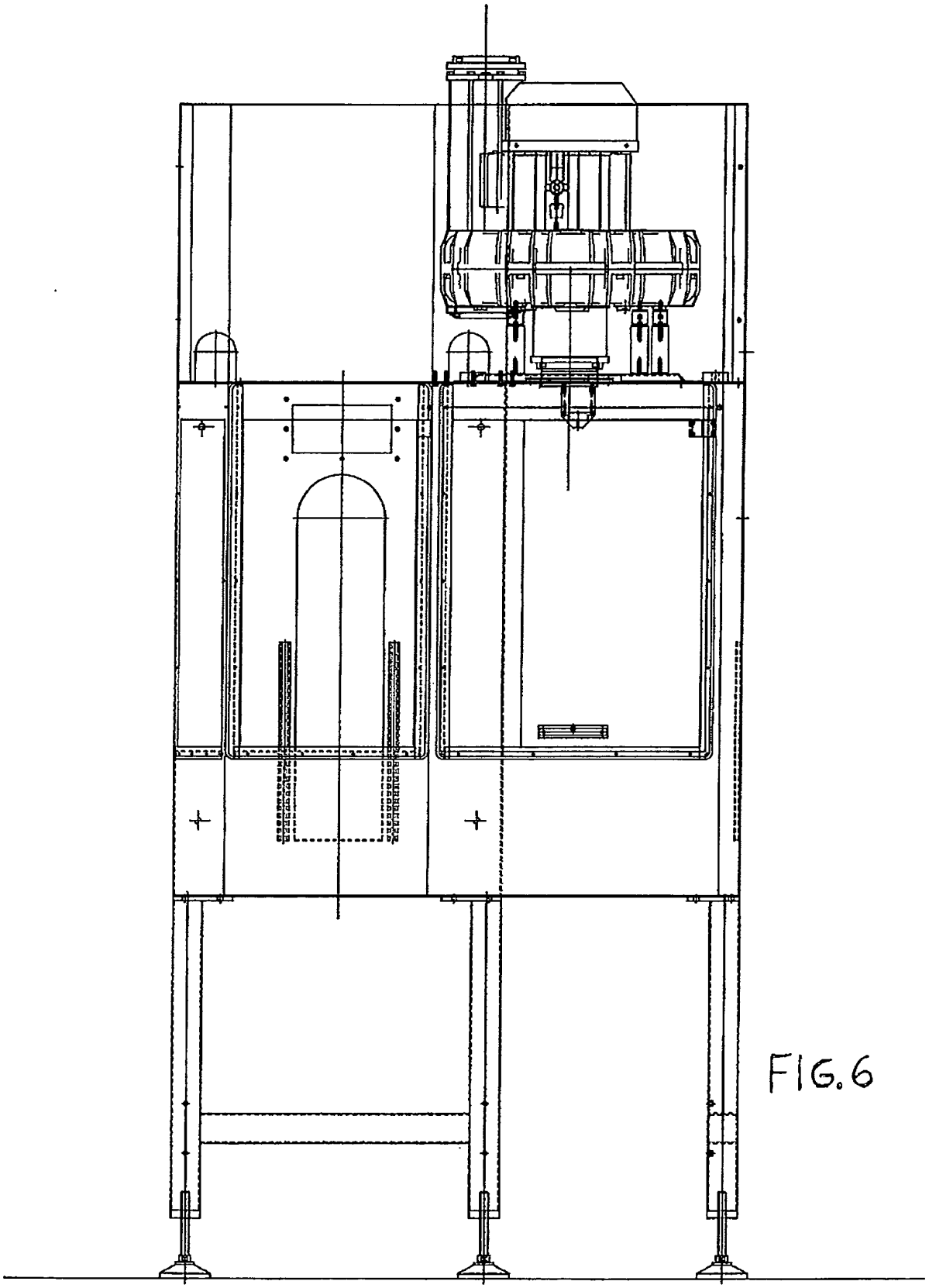

FIG.6

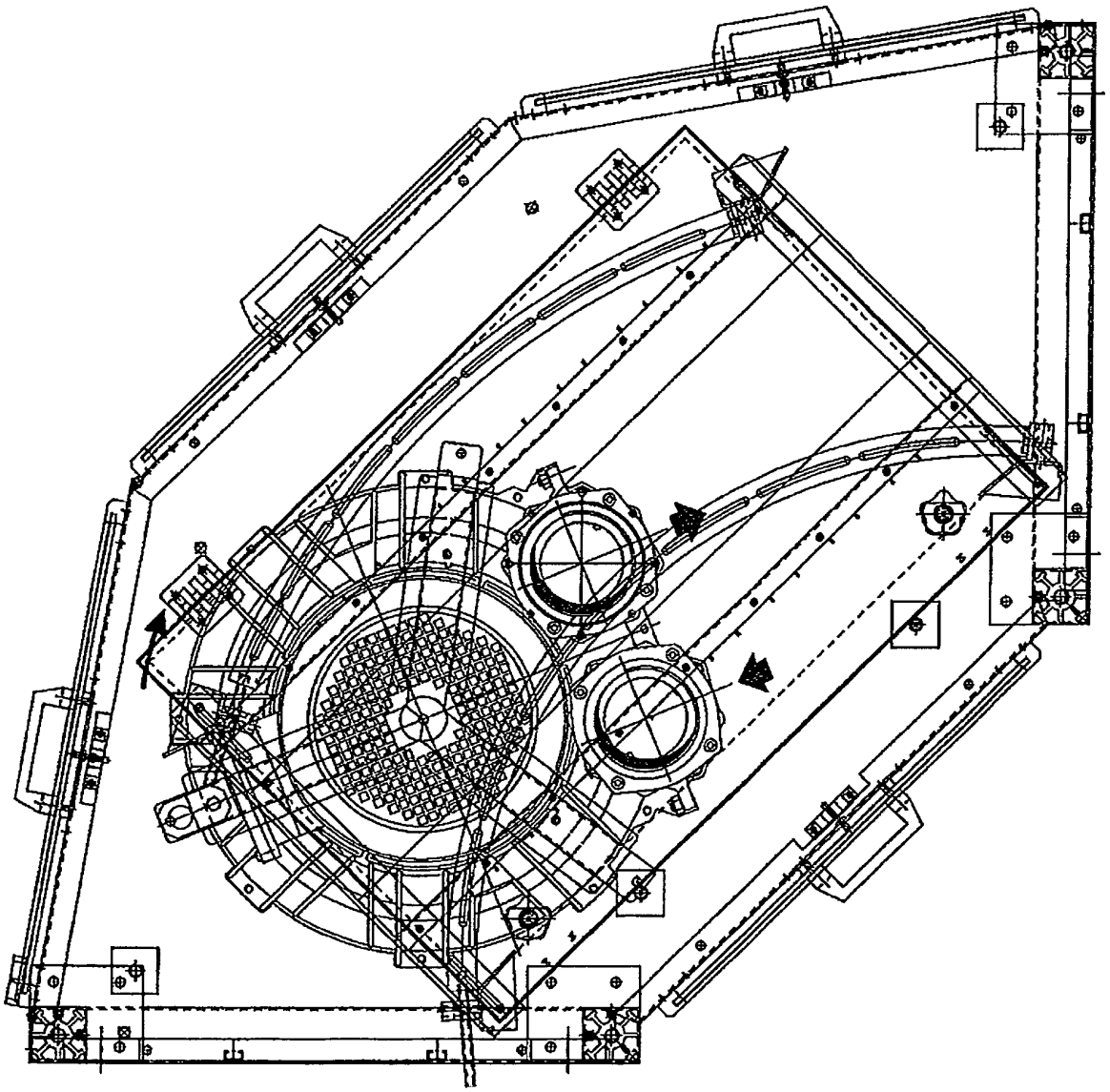

FIG.7

REFERENCES CITED IN THE DESCRIPTION

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Patent documents cited in the description

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