(19) Europäisches Patentamt
European Patent Office
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(11) **EP 2 199 210 A1**

(12) **EUROPEAN PATENT APPLICATION**

(43) Date of publication:
23.06.2010 Bulletin 2010/25

(51) Int Cl.:
B65B 7/28 *(2006.01)* ***B65B 31/02*** *(2006.01)*

(21) Application number: **09009258.6**

(22) Date of filing: **16.07.2009**

(84) Designated Contracting States:
AT BE BG CH CY CZ DE DK EE ES FI FR GB GR HR HU IE IS IT LI LT LU LV MC MK MT NL NO PL PT RO SE SI SK SM TR
Designated Extension States:
AL BA RS

(30) Priority: **19.12.2008 IT MI20082261**

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(54) **Container sealing machine**

(57) A sealing apparatus for containers, particularly trays, comprising:
- a die (7) supported by a support (9) and arranged to seal a sheet or a lid onto one or more trays;
- a lower half chamber (1) able to receive one or more containers;
- an upper half chamber (13) arranged, in cooperation with said lower half chamber, to form a gastight chamber;
- a motor (8) for moving said support;

characterised in that said upper half chamber is slidable along said support, said die being arranged to support and raise said upper half chamber.

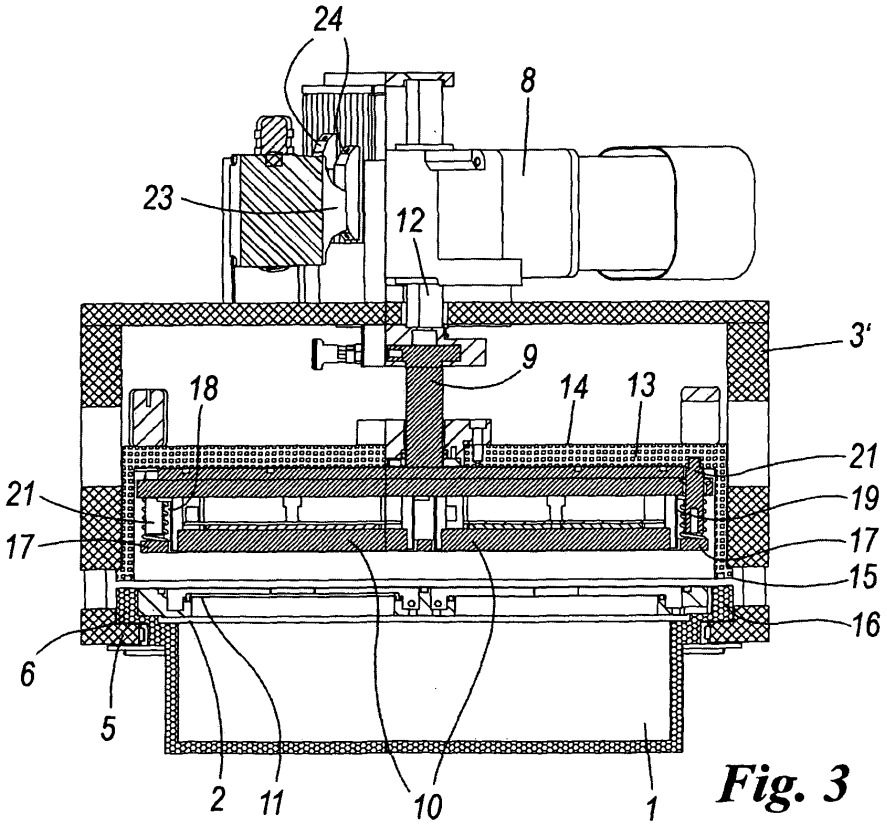

Fig. 3

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Description

[0001] The present invention relates to a sealing apparatus for containers, in particular plastic tray-type containers to be sealed by thermowelding a lid or sheet of compatible plastic material, the apparatus being in particular able to implement the sealing within a protected atmosphere or under vacuum.

[0002] In the food packaging field, semi-automatic sealing apparatuses are known comprising a lower half chamber, for example movable by an operator, to receive the container, an upper half chamber to be applied upperly to the lower half chamber to form a container-holding gastight chamber, within which a protective atmosphere of suitable composition, or vacuum, can be provided. A die is contained within the chamber to thermoweld the lid or closure sheet. The die and upper half chamber are usually movable by suitable means. Means are provided to lower and raise the upper half chamber and means to lower and raise the die, these being generally pneumatic means. This type of construction is fairly complicated and results in an apparatus of large overall size.

[0003] A more compact apparatus of simpler and more economical construction would therefore be desirable.

[0004] The aforestated problems are solved by a container sealing apparatus comprising:

- a die supported by a support and arranged to seal a sheet or a lid onto one or more containers;
- a lower half chamber able to receive one or more containers;
- an upper half chamber arranged, in cooperation with said lower half chamber, to form a gastight chamber;
- a motor (8) for moving said support;

characterised in that said upper half chamber is slidable along said support, said die being arranged to support and raise said upper half chamber.

[0005] The apparatus is preferably a semi-automatic apparatus for sealing plastic trays by thermowelding a sheet or lid of plastic material. This is preferably a sheet, the apparatus preferably being able to suitably cut the sheet in addition to thermowelding it onto the tray. An apparatus of the present invention could however be provided for containers other than trays, such as cups and the like.

[0006] According to one aspect of the invention, said die is arranged to support said upper half chamber when the die is in a raised position and the upper half chamber is not resting on the lower half chamber. The die is arranged to raise the upper half chamber when the die is raised through said motor support, to hence raise the upper half chamber from the lower half chamber.

[0007] The contents of the accompanying claims form a particular aspect of the invention.

[0008] The present invention will be more apparent from the description of preferred but non-exclusive embodiments thereof, with the aid of the accompanying figures, in which:

Figure 1 is a schematic overall view of an apparatus according to the present invention;

Figure 2 is a schematic exploded view of said apparatus;

Figure 3 is a schematic front section through part of said apparatus, with the die and the upper half chamber completely raised;

Figure 4 is a schematic front section through said part, with the die partially lowered and the upper half chamber resting on the lower half chamber;

Figure 5 is a schematic front section through said part, with the die and the upper half chamber completely lowered.

[0009] According to a particular aspect of the present invention, with reference to Figure 1, the apparatus can comprise a frame 3 for supporting the various components, and a lower half chamber 1 which, according to one aspect of the present invention, is able to be moved by an operator. The lower half chamber is arranged to contain one or more containers to be sealed. According to a particular aspect, these latter are positioned within the half chamber in a suitable manner by an operator. For example, with reference to Figures from 3 to 5, the lower half chamber can comprise a backing die 2 to receive and suitably retain the containers; in the illustrated example, this is a backing die able to receive two plastic trays and to cooperate with the die to enable this to cut off a plastic sheet and to thermoweld it.

[0010] The lower half chamber is intended to be inserted into the frame 3 in a suitable seat 4, which can be provided with guides 5 to cooperate with corresponding projections 6 on the half chamber, such that this latter can be retained in a suitable position. If considered necessary, means can be provided to lock the lower half chamber in its seat, to secure it during the operations.

[0011] The structure 3', forming part of the frame 3, supports a motor 8, preferably electric, which itself supports, and is arranged to move, a support 9 which supports the die 7. The motor is preferably provided with locking means, preferably an electromagnetic brake, to lock it in the desired position. According to a preferred aspect of the invention, the support 9 can translate vertically in both directions, under the action of the motor. The support 9 can comprise, for example, a rack 12 on which the motor can act via a suitable gear system.

[0012] The term "die" means in this case a device able to thermoweld a lid or sheet, preferably a sheet, of material compatible with that of the tray, along the edge of this latter.

[0013] The backing die 2 is arranged to support the trays, the body of which is inserted into the cavity in the backing die, and the edge of which is supported by this latter. The die 7 comprises the plates 10 arranged to grip the edge of the trays between itself and a suitable surface 11 of the backing die. The plates 10 are heated to cause

thermowelding.

[0014] As stated, the die is rigid with the support 9, which can comprise a shaft-shaped part, preferably cylindrical; the upper half chamber 13 is slidable thereon in a gastight manner. For example, the support can pass through an upper wall 14 of the upper half chamber providable with gaskets suitable to enable mutual sliding while preventing gas passage. The upper half chamber has a lower edge able to seal against an upper edge 16 of the lower half chamber, so as to form a seal. At least one of the two edges can hence be provided with a gasket of suitable type.

[0015] Figure 3 shows the condition in which the die is completely raised. It can be seen that the upper half chamber is also raised and rests on the die, which supports it. In Figure 4, by partially lowering the die, the upper half chamber is lowered until it rests with its edge on the edge of the lower half chamber. At this point, further lowering of the die does not result in further descent of the upper half chamber, which continues to rest on the lower half chamber, however the support is able to slide relative to it. In this manner, the situation of Figure 5 can be attained, in which the die is in a position to implement thermowelding.

[0016] Having attained the position of Figure 4, the two half chambers form a gastight chamber. From this moment the air present in this chamber can be evacuated and a suitable atmosphere introduced, able for example to preserve foods contained in the tray. One or both the half chambers can be connected to suction or gas introduction channels, in a manner to that which occurs in apparatuses of known type. For example, suction can take place via holes provided in the wall of the upper half chamber and gas be introduced through holes provided in the wall of the lower half chamber. It has been found that if, as usually happens, the pressure within the chamber formed as aforedescribed is maintained lower than or in the limit equal to atmospheric pressure during the operations, a sufficient seal can be generated by giving an adequate weight to the upper half chamber. By suitably increasing the weight, an apparatus can be formed which if necessary can also operate with overpressures in the chamber.

[0017] When the suitable atmosphere has been created in the chamber and hence in the container, the position of Figure 5 enables the container to be sealed. Having finished this operation, by reversing the movement of the motor 8 the die can be again raised. On again attaining the condition of Figure 4, the upper half chamber returns to rest on the die such as to be raised into the situation of Figure 3. The operator can at this point extract the lower half chamber and replace it, or replace the containers. If necessary, guides 21 can be provided to better direct the mutual movement between the half chamber and the die.

[0018] The motor action can be controlled manually or by an automatic system, for example an electronic control unit (22 in Figure 1), which can also control all the other machine components. For example, the entire series of described operations can take place automatically once the lower half chamber has been inserted into position, optionally after operator consent given by an appropriate command. The stoppage times in the various positions can be pre-regulated according to requirements. The apparatus can comprise optical or mechanical sensors to determine the position of the support and of the components connected to it. For example, in Figures from 2 to 5, a system of mechanical sensors 23 is shown using cams 24 connected to the rack 12 and hence to the support.

[0019] The die is preferably provided with devices to lock the sheet in position in cooperation with corresponding surfaces of the backing die. These can be strips 17 suitably disposed along part or all of the die perimeter, with a series of springs 18 to press them against the backing die when the die has been sufficiently lowered. The sheet, which can be unwound from a roll, is suitably positioned between the die and backing die, generally by the operator. The sheet can preferably have a length sufficient to cover the tray edges, but not such as to completely isolate the space between the two half chambers, in order to enable gases to circulate during evacuation or introduction, as aforestated. The plates 10 are also generally connected to the die by spring means such that when the die descends, the sheet is suitable compressed and retained. The seal means between the lower and upper half chamber are such as to also be able to operate in the presence of the sheet when traversing a part of the edge perimeter. A gasket of adequate thickness and/or elasticity is generally sufficient. The die is preferably provided between the plates and strips with cutting means, such as a perimetral blade 19 which, when the plates and strips are compressed by the die, projects from them in the sheet direction, into a cavity 20 of the backing die, such as to cut off any sheet part which exceeds the tray. With regard to the sheet retention, welding and cutting, and the die construction to perform these operations, the system is similar to that in semi-automatic apparatuses of the known art, hence further description is not necessary.

[0020] As stated, the sheet can be unwound from a roll positioned on the half chamber and locked by the operator by a system of magnets to the rear of the lower half chamber.

[0021] The apparatus of the present invention eliminates the need for the user to use pneumatic systems, and the overall size, constructional complexity and costs are reduced. Moreover it has been found that a very low power is sufficient for the electric motor. For example, for a machine able to simultaneously seal two trays of dimensions 20x30 cm or one of 40x30 cm, the motor power can be just 60W. The characteristics of the chosen motor will in any event be adequate for the particular production requirements.

Claims

1. A container sealing apparatus, comprising:

   - a die (7) supported by a support (9) and arranged to seal a sheet or a lid onto one or more containers;
   - a lower half chamber (1) able to receive one or more containers;
   - an upper half chamber (13) arranged, in cooperation with said lower half chamber, to form a gastight chamber;
   - a motor (8) for moving said support;

   characterised in that said upper half chamber is slidable along said support, said die being arranged to support and raise said upper half chamber.

2. An apparatus as claimed in claim 1, wherein said die is arranged to thermoweld a sheet of plastic material along the edge of one or more plastic trays.

3. An apparatus as claimed in any preceding claim, **characterised in that** said motor is an electric motor.

4. An apparatus as claimed in any preceding claim, comprising means for drawing and/or introducing gas into the chamber formed by the two half chambers.

5. An apparatus as claimed in any preceding claim, wherein said motor is arranged to translate said support in a vertical direction.

6. An apparatus as claimed in any preceding claim, comprising sensors (23, 24) to determine the support position.

7. An apparatus as claimed in any preceding claim, wherein said support is shaped as a cylindrical shaft and passes through an upper wall (14) of said upper half chamber, at least one gasket being interposed between said upper half chamber and said support.

8. An apparatus as claimed in any preceding claim, comprising an electronic control unit (22) for controlling the motor.

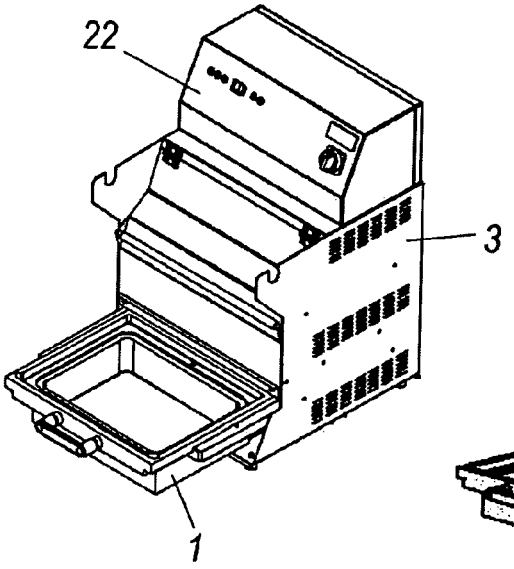

Fig. 1

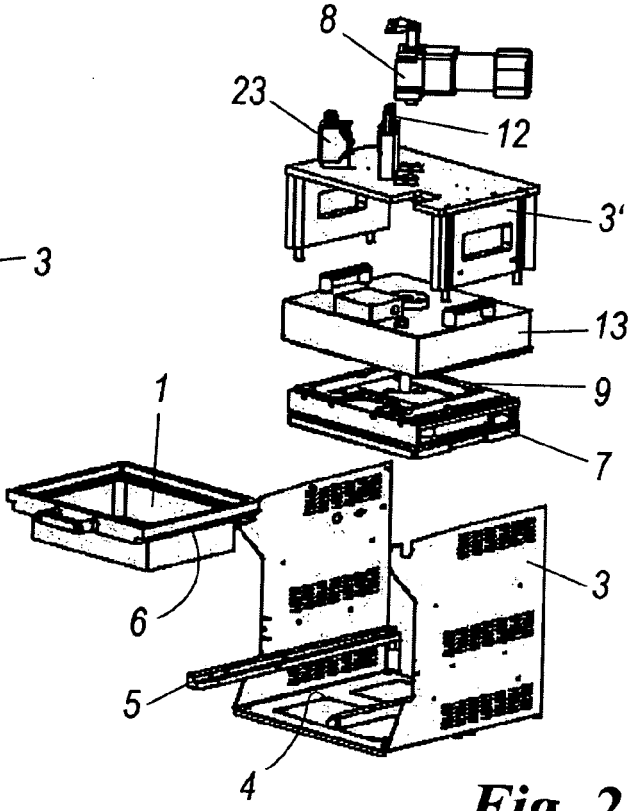

Fig. 2

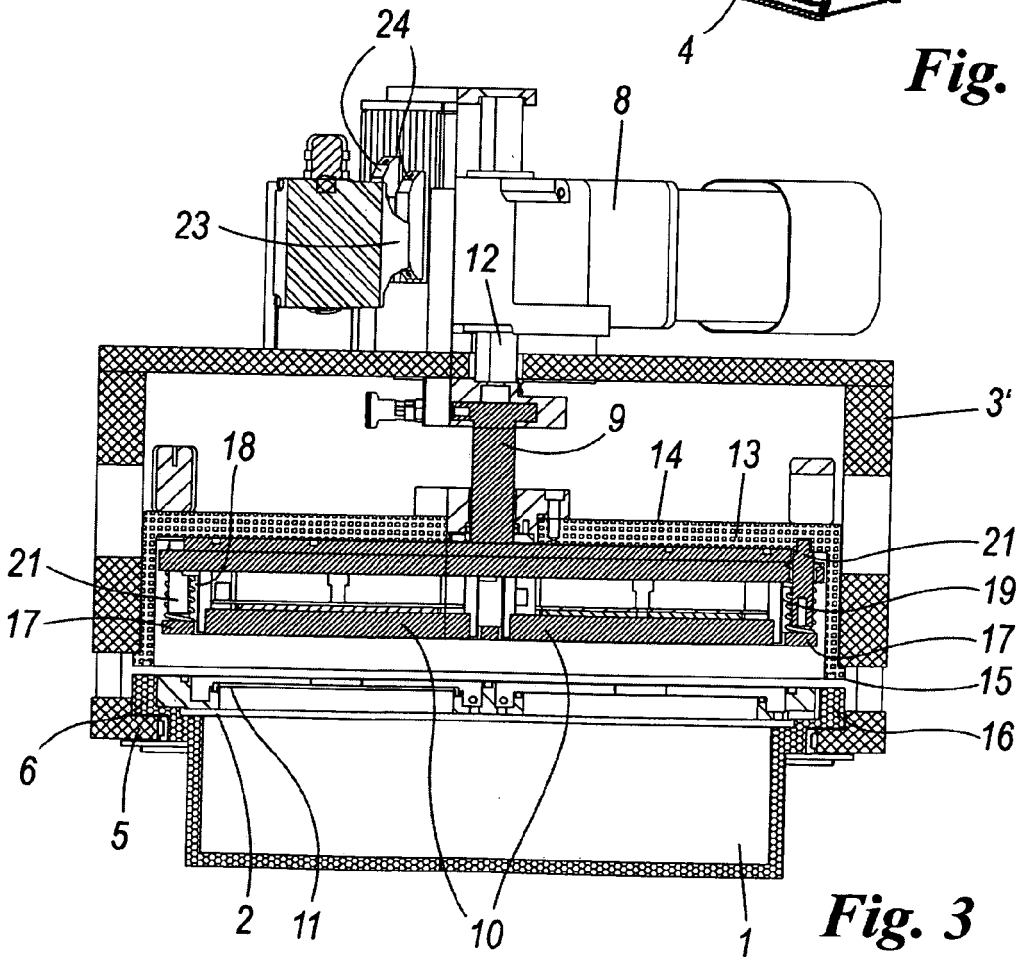

Fig. 3

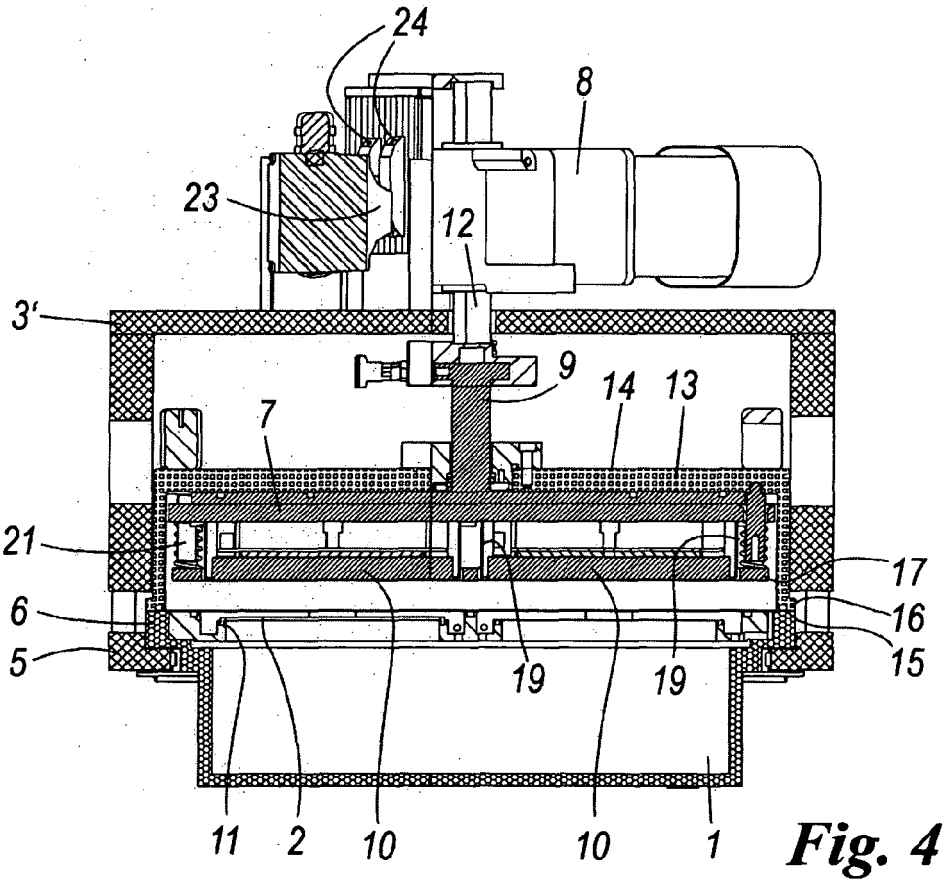
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Fig. 4

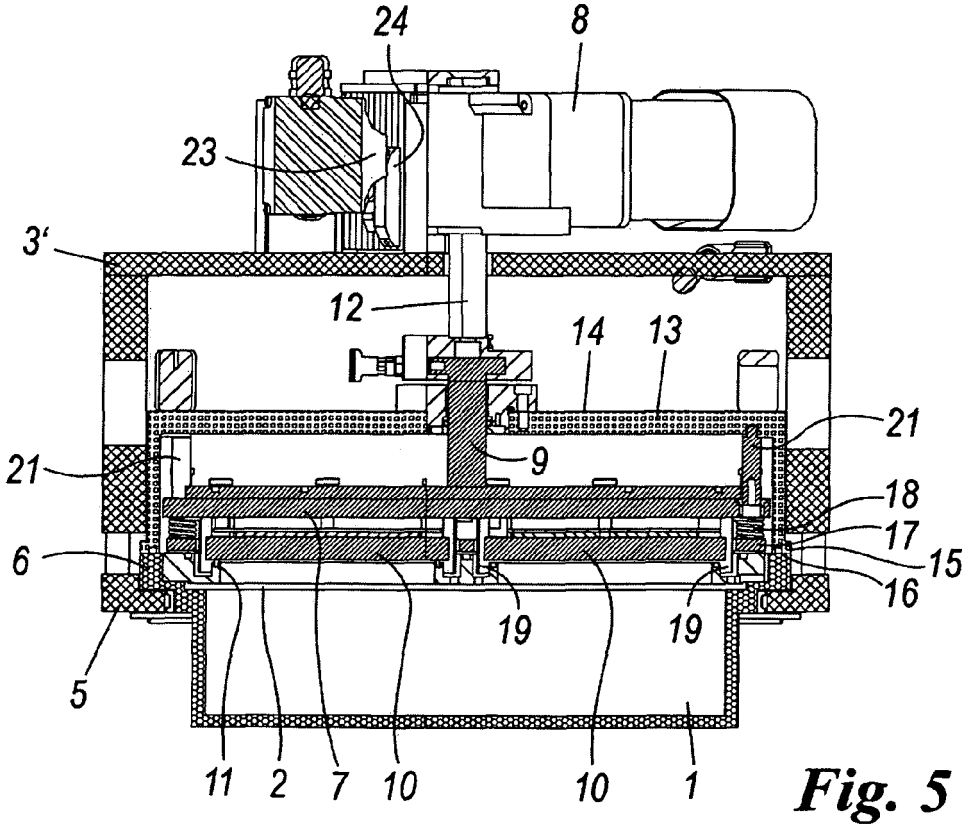
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Fig. 5

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EUROPEAN SEARCH REPORT

Application Number
EP 09 00 9258

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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
Munich	2 November 2009	Philippon, Daniel

CATEGORY OF CITED DOCUMENTS

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