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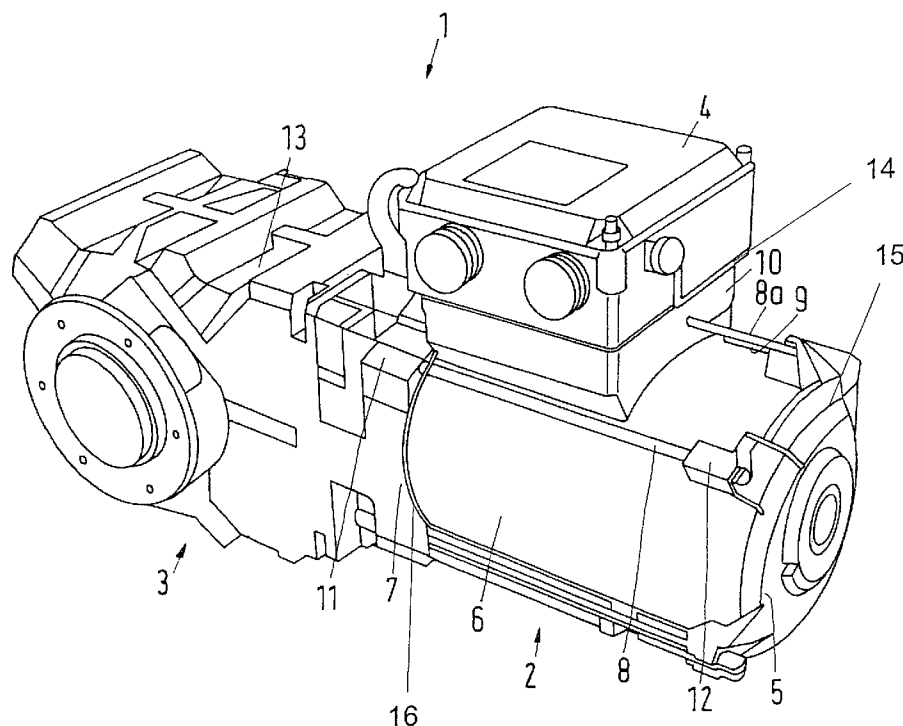
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(54) Title: GEAR MOTOR



(57) Abstract: The invention concerns a gear motor for a production plant, the gear motor having a motor section and a gear section, which are connected to each other to form one unit. In order to improve the utilisation coefficient of a production plant, the unit has an antibacterial and/or antimicrobial coating.

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Gear motor

The invention concerns a gear motor for a production plant,  
5 the gear motor having a motor section and a gear section,  
which are connected to each other to form one unit.

Such gear motors are used for a variety of driving purposes. For example, they serve as drives for processing  
10 and packing machines in the food and beverage industry.  
They can also be used to drive conveyor belts.

In the food and beverage industry the production is submitted to severe requirements with regard to hygiene conditions and cleaning concepts. In order to meet these requirements, gear motors used in production plant often  
15 have a stainless steel surface. Stainless steel permits the use of alkaline and acidic detergents together with disinfectants to ensure extinction of relevant germs and  
20 bacteria.

A cleaning of the gear motor is additionally made difficult in that it is often mounted directly on the production and conveying systems. This means that cleaning can  
25 only take place after end of production or during production standstill. However, during running production germs can form on the gear motors, which can then be transferred to products.

30 Therefore, if possible, gear motors are located in places, where only little impurification of the gear motor must be anticipated.

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In this connection it has been endeavoured to make the surface of gear motors as smooth as possible to enable an easier cleaning of the surface of the gear motors.

- 5 Also with such an embodiment, germs and impurities gather on the surface of the gear motor during operation. Therefore, a frequent cleaning of the surface of the gear motor is required. However, also during the time intervals between such cleanings, harmful germs will be transferred.
- 10 Such germs can be transferred to manufactured products and will have negative effects on the product quality.

During the cleaning process the production plant is usually stopped. Due to severe requirements on the cleanness,

15 this causes frequent standstill periods and thus a poorer utilisation coefficient of the production plant.

The invention is based on the task of providing a gear motor that increases the utilisation coefficient of the production plant.

20

With a gear motor as mentioned in the introduction, this task is solved in that the unit has an antibacterial and/or antimicrobial coating.

25 Such a coating causes the death or at least a decimation of germs, for example bacteria, fungi or yeasts, as soon as they get in touch with the coating. This is a simple method of preventing the transfer and spreading of a number of germs in production plant. This causes a significant increase of the production and product quality, as a reduction of re-infections and attacks occurs. At the same time, the cleaning intervals can be extended, as the coat-

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ing prevents the growth of germs. This reduces required standstill periods, so that the utilisation coefficient of the production plant is increased.

- 5 It is preferred that the coating contains silver ions or copper ions. Germs will die, if they get in touch with silver and copper ions. The emission of silver and copper ions will have no harmful effect on human beings, animals or plants. Thus, the addition of silver or copper ions  
10 will ensure an antibacterial and antimicrobial coating.

Preferably, the coating is made as a silver coating. The number of silver ions is particularly high in a silver coating. At the same time, silver provides a surface that  
15 is easy to clean and that hardly reacts with other substances after the oxidation.

Preferably, the coating covers joints between elements of the unit. Elements are, for example, the motor section and  
20 the gear section, but could also be further units, like for instance a terminal box or a control device, which are located at the unit. A covering of the joints is achieved in that the unit will not be provided with the antibacterial and/ or antimicrobial coating until the assembly is  
25 finished. Thus, the amount of coating material is kept small, and a good sealing of the surface is achieved.

In a preferred embodiment the elements of the unit also have the coating at the joints. This is achieved in that  
30 the individual elements are provided with the coating before assembly. Then, the antibacterial and antimicrobial coating will also exist between the elements. Also when

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individual elements are replaced, the coating will not be damaged.

Preferably, the coating is made as a lacquer coating. A  
5 lacquer coating can be applied with known means. Thus, a homogenous surface can be achieved.

Preferably, the unit has a housing, which is closed to all sides. Thus, a penetration of germs into the unit is prevented. A disassembling of the unit would be necessary to  
10 remove such germs. This would cause long standstill periods, which are now avoided. The motor must of course be dimensioned accordingly, as no active cooling, for example by means of a fan, can take place.

15

Preferably, the housing is made to be free of fins. Fins usually serve the purpose of enlarging the surface of a housing to provide a larger heat transfer surface for the waste heat of the motor. However, germs and impurities  
20 will gather in the spaces between individual fins. Large resources are required to remove these germs and impurities. However, a housing with no fins provides a smooth surface that is easy to clean.

25 In another embodiment, the housing has cooling fins. Thus, it is possible to use motors with a higher performance, though maintaining the dimensions. However, the resources to be spent on cleaning will be increased. Such an embodiment is recommended, where the space is narrow.

30

Preferably, the gear motor has a control device, which is connected to the gear motor via a connection cable and has an antibacterial and/or antimicrobial coating. The control

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device can, for example, be a frequency converter. As the control device is connected to the gear motor via a connection cable, a decentral location, that is, a separate location of gear motor and control device, is possible.

- 5 The antibacterial and/or antimicrobial coating of the control device will further reduce the spreading and transfer of germs in production plant. It is also favourable to provide not only the gear motor as a unit, but also the connected elements, with an antibacterial and antimicrobial coating. The same coating can be used for both the  
10 elements and the gear motor. Also merely providing the elements with a coating will reduce the spreading of germs.

In the following, the invention is described in detail on the basis of a preferred embodiment in connection with the  
15 drawing, showing:

Only Fig. a perspective view of a gear motor

- 20 A gear motor 1 has a motor section 2 and a gear section 3, which are assembled by means of flanges to form a unit. The motor section 2 comprises, for example, an electric motor, which is supplied with electrical energy and, if required, with control information, via a terminal box 4.
- 25 A bearing plate 5 is located at one axial end of a housing section 6. The bearing plate 5 is connected by clamping pieces 8, 8a to a housing part 7 at the other end of the motor section 2. The clamping pieces 8, 8a can, for example, be threaded screw bolts. It is also possible to guide  
30 the clamping pieces 8, 8a inside the wall partition of the motor housing, so that a completely smooth surface occurs. A modification of the motor itself will not be required.

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In a manner not shown in detail, also brakes and revolution transmitters can be fixed on the bearing plate 5. It is desirable for these units to have a smooth surface.

5 The housing section 6 has the shape of a cylinder. Apart from a socket 10 carrying the terminal box 4, the surface of the cylinder jacket is smooth. With another embodiment of the terminal box 4, this socket 10 can also be avoided. The gear motor 1 could then, for example, be connected to  
10 a supply device and/or a control device by means of a circular plug.

With this embodiment, the bearing plate 5 and the housing part 7 have projections 11, 12, which are required to fix  
15 the clamping pieces. Apart from that, the bearing plate 5 and the housing part 7 are smooth and substantially cylinder shaped.

The gear section 3 has recesses 13, which have, however,  
20 such a large surface that they are easy to clean. In principle it is, however, desirable to avoid such recesses.

Not having cooling fins on the motor section and not having openings, through which cooling air can enter and  
25 leave, ensures a unit with a closed and smooth surface, which is easy to clean. Further, the risk that dirt can gather is kept small.

The gear motor 1 has an antibacterial and/or antimicrobial  
30 coating. This coating can be applied after the assembly of the unit. Then the coating will also cover the joints at the connections 14, 15, 16, which exist between the housing section 6 and the housing part 7, between the housing

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section 6 and the bearing plate 5 and between the terminal plate 4 and the socket 10.

In this case, the socket 10 is made in one piece with the housing section 6, so that no joint exists between these two elements.

Alternatively, the terminal box 4, the bearing plate 5, the housing section 6 and the housing part 7 can be coated before the assembly. In this case, the elements are also coated in the areas, with which they bear on each other after the assembly. This increases the need for coating material, but permits a replacement of individual elements without damaging the coating.

15

In any case, the surface of the gear motor has an antibacterial and/or antimicrobial coating, so that the transfer and spreading of harmful bacteria, fungi and yeasts in production plant are prevented. The coating particularly contains silver and/or copper ions. It can be made as a lacquer or be applied in the way of a lacquer. It can also be made as a silver coating. The silver and copper coating or the silver or copper ion containing lacquer is in this connection based on the principle of oligo-dynamic effects.

25

The germ killing or germ reducing effect is further amplified in that also the componentss connected to the gear motor, for example a frequency converter, are provided with an antibacterial and/or antimicrobial coating. Such units are, however, not shown in the figure.

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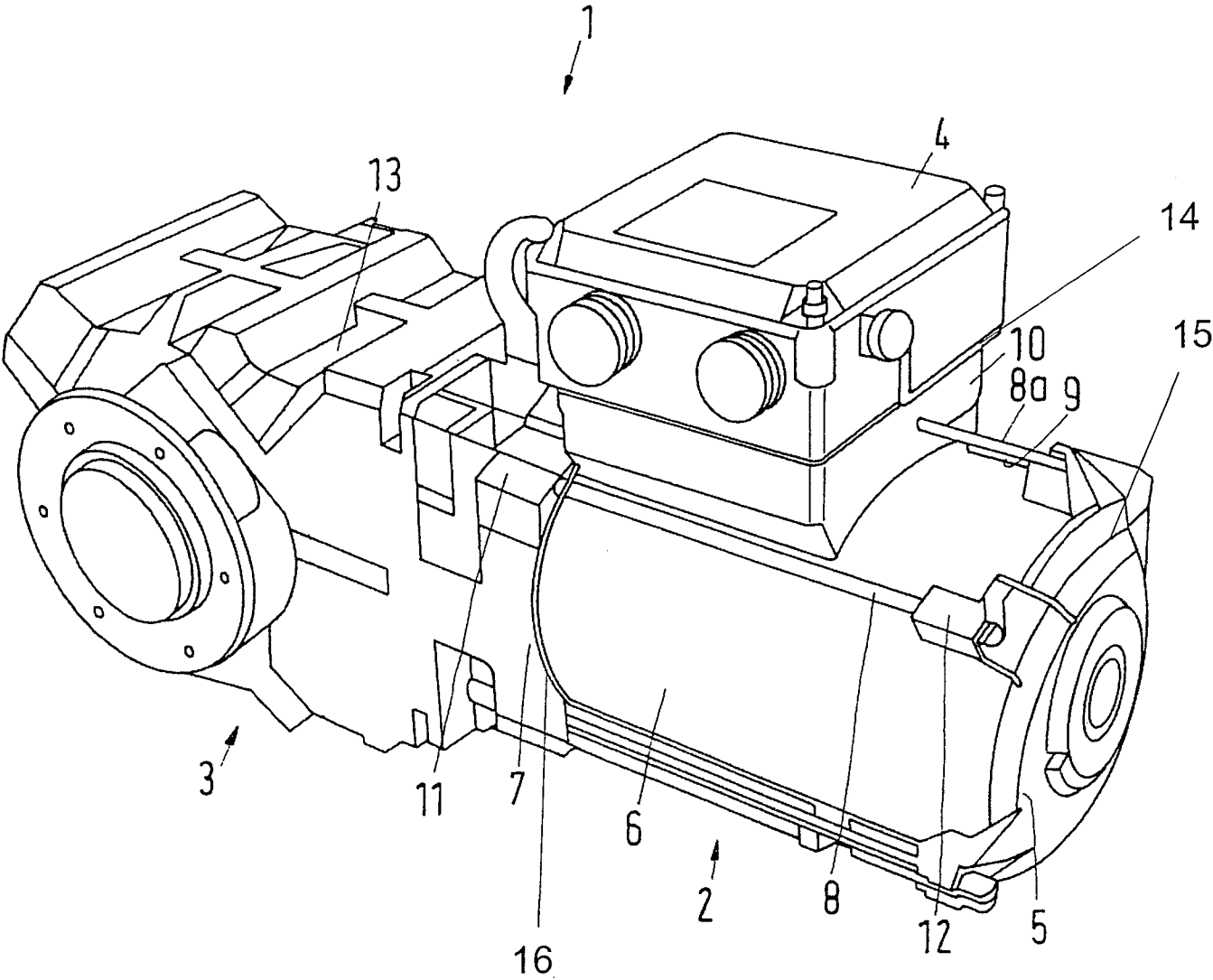


Patent Claims

1. Gear motor for a production plant, the gear motor  
5 having a motor section and a gear section, which are connected to each other to form one unit, **characterised in** that the unit has an antibacterial and/or antimicrobial coating.
- 10 2. Gear motor according to claim 1, characterised in that the coating contains silver ions or copper ions.
3. Gear motor according to claim 1, characterised in that the coating is made as a silver coating.
- 15 4. Gear motor according to one of the claims 1 to 3, characterised in that the coating covers joints (14, 15, 16) between elements (4, 5, 6, 7, 10) of the unit.
- 20 5. Gear motor according to one of the claims 1 to 3, characterised in that the elements (4-7, 10) of the unit also have the coating at the joints (14, 15, 16).
- 25 6. Gear motor according to one of the claims 1 to 5, characterised in that the coating is made as a lacquer coating.
- 30 7. Gear motor according to one of the claims 1 to 6, characterised in that the unit has a housing, which is closed to all sides.

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8. Gear motor according to one of the claims 1 to 7,  
characterised in that the housing is made to be free  
of fins.
- 5 9. Gear motor according to one of the claims 1 to 7,  
characterised in that the housing has cooling fins.
10. Gear motor according to one of the claims 1 to 9,  
characterised in that the gear motor has a control  
10 device, which is connected to the gear motor via a  
connection cable and has an antibacterial and/or an-  
timicrobial coating.



# INTERNATIONAL SEARCH REPORT

International application No  
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**A. CLASSIFICATION OF SUBJECT MATTER**  
INV. A61L2/238 H02K5/02  
ADD. H02K7/116

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)  
A61L H02K

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 practical, search terms used)

EPO-Internal

**C. DOCUMENTS CONSIDERED TO BE RELEVANT**

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A	US 5 536 258 A (FOLDEN THOMAS I [US]) 16 July 1996 (1996-07-16) abstract; figures	3
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☒ Further documents are listed in the continuation of Box C.

☒ See patent family annex.

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International application No

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## C(Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

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