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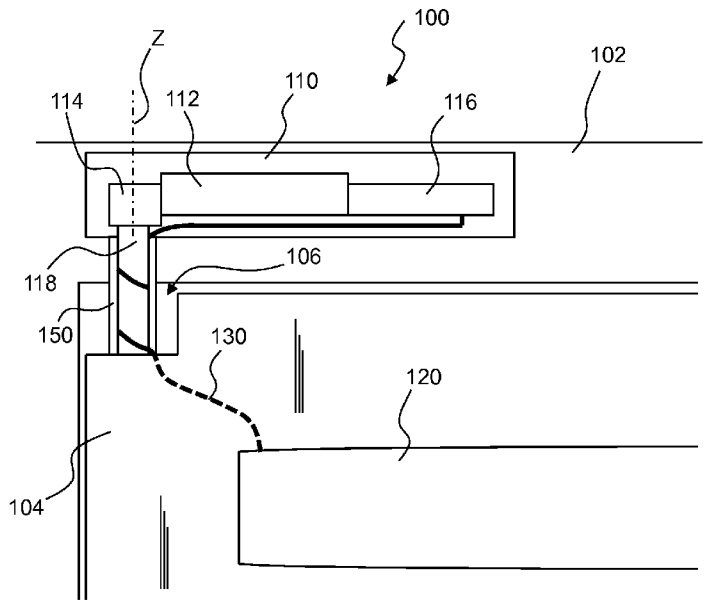


Fig. 2

(57) Abstract: A system for a swing door arrangement is provided. The system comprises a drive unit (110, 210) and an auxiliary device (120, 220) being connected to said drive unit (110, 210) via at least one cable (130, 230). The drive unit (110, 210) comprises a rotational drive shaft (118, 218) being connected to a door leaf (104, 204) and the at least one cable (130, 230) is routed around the drive shaft (118, 218).

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A SYSTEM FOR A SWING DOOR ARRANGEMENT

Technical Field

The present invention relates to a system for a swing door arrangement. More particularly the present invention relates to a system allowing an auxiliary device to be connected to a drive unit of a swing door arrangement.

Background

Swing door arrangements normally include a door leaf being pivotally supported by a door frame. For automatic operation of the swing door arrangement a drive unit is provided, which urges the door to open or close. Activation of the drive unit is typically enabled by providing some kind of sensor which detects a situation that requires the door leaf to move; such sensor may e.g. be a sensor that detects that a person is approaching the door, a manual handle which is pushed down, or a lock which triggers automatic opening or closing after a predetermined time period.

As the drive unit needs to be connected to the sensor cables are used. The cables do not only provide for communication between the sensor and the drive unit but also powering of the sensor. While the sensor is mounted on the outside of the door leaf, while the drive unit is mounted remote from the sensor (e.g. inside the door frame) the necessary cables are routed from the door frame to the door leaf. The cables will thus be affected by abuse and frequent wear and tear, resulting in either a dysfunctional operation of the swing door arrangement or lack of safety around the swing door arrangement.

In view of the above-mentioned problems it would be desirable with a solution providing improved robustness and safety of swing door arrangements.

Summary

An object of the present invention is therefore to provide a solution to the above-mentioned problem, reducing the disadvantages of prior art solutions.

An idea of the present invention is to provide a shrouded routing of the cables used for connecting a drive unit with an auxiliary device, such as a sensor.

According to a first aspect, a system for a swing door arrangement is provided. The system comprises a drive unit and an auxiliary device being connected to said drive unit via at least one cable, wherein the drive unit comprises a rotational drive shaft being connected to a door leaf and wherein the at least one cable is routed around the drive shaft. This solution does not only solve the above-mentioned problems of prior art, but also allows for a solution which can be pre-assembled in factory.

The auxiliary device may be a sensor, a handle, or a lock mounted on the door leaf.

The drive unit may be mounted inside a door frame, and the rotational drive shaft may be arranged to drive a pivot joint connecting the door leaf to the door frame.

The drive unit may be mounted on the exterior side of a door frame, and the rotational drive shaft may be driving a linkage connecting the door leaf to the door frame.

In such embodiment the at least one cable may be routed at least partly along the linkage.

The at least one cable may be routed at least partly inside the door leaf.

According to a second aspect a swing door arrangement is provided. The swing door arrangement comprises a door frame, a swinging door leaf, and a system according to the first aspect. The swing door arrangement may be a swing door arrangement of any kind, for example it may be a standard swing door arrangement with the pivot point situated at the end of the door leaf or a so called balance door with a pivot point situated closer to the middle of the door leaf and a smaller turn radius.

The drive unit may be mounted at the door frame and the auxiliary device may be mounted at the door leaf.

According to a third aspect a method for providing a system for a swing door arrangement is provided. The method comprises i) providing a drive unit and an auxiliary device, ii) connecting the drive unit to the auxiliary device by means of at least one cable, and iii) routing the at least one cable at least partly around a drive shaft of the drive unit.

Brief Description of the Drawings

Embodiments of the invention will be described in the following; reference being made appended drawings which illustrate non-limiting examples of how the inventive concept can be reduced into practice.

Fig. 1 is a front view of a prior art swing door arrangement.

Fig. 2 is a front view of a system for a swing door arrangement according to an embodiment.

Fig. 3 is a front view of a swing door arrangement according to another embodiment.

Fig. 4 is a detailed view of a system used in the swing door arrangement shown in Fig. 3.

Fig. 5 is a schematic view of a method according to an embodiment.

Detailed Description

Starting in Fig. 1 a swing door arrangement 1 according to prior art solutions is shown. The arrangement 1 includes a door frame 2 and a door leaf 3 being pivotally connected to the door frame 2 via a vertical rotational axis Z. For automatic operation of the swing door arrangement 1 a drive unit 4 is provided. The drive unit 4 is in driving connection with the pivotal connection between the door leaf 3 and the door frame 2 for swinging the door leaf 3 between an open position and a closed position.

The drive unit 4 receives a command signal from an auxiliary device 5 being in the form of e.g. a sensor configured to detect a person approaching the swing door arrangement 1. Upon such detection the sensor 5 transmits a signal to the drive unit 4 via one or more cables 6. For proper installation the one or more cables 6 is connected to the drive unit 4 at one end and at the sensor 5 at the opposite end.

As the drive unit 4 is mounted inside the door frame 2, while the sensor 5 is arranged on the exterior side of the door leaf 3, the at least one cable 6 has an intermediate portion extending on one side of the door leaf 3. Importantly the length of the intermediate portion of the cable 6 must allow for a fully swung door leaf 2 without initiating a pulling force on the cable 6. Therefore, when the door leaf 2 is in a closed position the cable 6 will be hanging and consequently the cable 6 is accessible for persons abusing the swing door arrangement 1.

In Fig. 1, the drive unit 4 is further connected to a power cable 7 which is provide to provide riving power to the drive unit 4, and to the sensor 5 via the routed cable 5.

Now turning to Figs. 2-4 different embodiments of a system for a swing door arrangement 10 will be described.

Starting in Fig. 2 a part of a swing door arrangement 100 is shown. The swing door arrangement 100 comprises a door frame 102 and a door leaf 104 attached to the door frame 102 by means of a rotational pivot connection 106 extending along a vertical rotational axis Z. The door leaf 104 is thus allowed to swing between an open and closed position.

The swing door arrangement 100 is provided with a drive unit 110 .The drive unit 110 is preferably mounted within the door frame 102, and it includes an electrical motor 112, a gear box 114 for reducing the speed of the electrical motor 112, and power electronics 116 for driving the electrical motor 114. The output of the gear box 114 is connected to an output shaft, or rotational drive shaft 118 forming part of the pivot connection 106 between the door frame 102 and the door leaf 104.

The swing door arrangement 100 also comprises an auxiliary device 120 in communication with the drive unit 110, in particular with the power electronics 116.

The auxiliary device 120, e.g. in the form of a sensor detecting the presence of a person approaching the swing door arrangement 100, a panic bar which is connected to switches enabling opening of the door in emergency situations, a handle, or a lock, is configured to issue a command signal to the drive unit 110. Upon receiving the command signal the drive unit 110 is activated for driving to door leaf 104 to its desired position by rotation of the electrical motor 112 and the connected rotational drive shaft 118.

The auxiliary device 120 is preferably mounted on an exterior side of the door leaf 104.

As is evident the auxiliary device 120 requires power, as well as a communication link to the drive unit 110. This is provide by means of one or more cables 130 extending between the power electronics 116 of the drive unit 110 and the auxiliary device 120.

As is shown in Fig. 2 the at least one cable 130 is routed from the power electronics 116 of the drive unit 110 to the rotational drive shaft 118, around which the at least one cable 130 is twisted. Notably, the at least one cable 130 may be twisted one or multiple revolutions around said rotational drive shaft 118, however it may also only be twisted less than one revolution around the drive shaft 118, i.e. only partially surrounding the drive shaft. The at least one cable 130 extends from the rotational drive shaft 118 into a hollow space in the door leaf 104, and connects with the auxiliary device 120 e.g. via a through hole in an exterior panel of the door leaf 104.

As the cable 130 is routed around the rotational drive shaft 118 the door leaf 104 may pivot freely without inducing any pulling force in the cable 130.

Preferably the rotational drive shaft 118 is surrounded by a cylindrical cover 150 also accommodating the cable 130. In this manner the cable 130 will always be protected and hidden.

Now turning to Figs. 3 and 4 another embodiment of a swing door arrangement 200 will be described. As can be seen in Fig. 3 the swing door arrangement 200 comprises a door frame 202 and a door leaf 204 pivotally connected to the door frame 202 by means of a non-driven pivot joint 206 extending vertically along a rotational axis Z.

Automatic operation of the swing door arrangement 200 is accomplished by a drive unit 210 being connected with the door leaf 204 via a linkage 240. The drive unit 210 is configured to receive a command signal from an auxiliary device 220 via one or more cables 230 (see Fig. 4). As explained with reference to Fig. 2, the auxiliary device 220 may e.g. a sensor detecting the presence of a person approaching the swing door

arrangement 200, a panic bar, a handle, or a lock. The cable 230 also provides power to the auxiliary device 220 from the drive unit 210.

Further details are shown in Fig. 4. The drive unit 210 is preferably mounted on an exterior side of the door frame 202, and it includes an electrical motor 212, a gear box 214 for reducing the speed of the electrical motor 212, and power electronics 216 for driving the electrical motor 214. The output of the gear box 214 is connected to an output shaft, or rotational drive shaft 218.

The rotational shaft 218 is fixedly attached to an end of a first lever arm 242 of the linkage 240. The opposite end of the first lever arm 242 is pivotally connected to an end of a second lever arm 244 via a pivot joint 246. The opposite end of the second lever arm 244 is attached to the door leaf 204.

When the drive unit 210 is activated the rotational drive shaft 218 will rotate, urging the first lever arm 242 to turn as well. This will provide a force also to the second lever arm 244, thus urging the door leaf 204 to pivot accordingly.

The one or more cables 230 connects the power electronics 216 of the drive unit 210 with the auxiliary device 220. The cable 230 is routed from the power electronics 216 of the drive unit 210 to the rotational drive shaft 218, around which the at least one cable 230 is twisted at least one revolution. The at least one cable 230 extends from the rotational drive shaft 218 along the first and second lever arms 242, 244 of the linkage 240 and further into a hollow space in the door leaf 204. From there the one or more cables 230 connects with the auxiliary device 220 e.g. via a through hole in an exterior panel of the door leaf 204. The one or more cables 230 may accordingly extend inside the linkage 240.

Also for this embodiment the rotational drive shaft 218 may be surrounded by a cylindrical cover 250 also accommodating the cable 230. In this manner the cable 230 will always be protected and hidden.

Now turning to Fig. 5 a method 300 for providing a system for a swing door arrangement 100, 200 will be briefly explained. The method 300 comprises a first step 302 of providing a drive unit 110, 210 and an auxiliary device 120, 220, a second step 304 of connecting the drive unit 110, 210 to the auxiliary device 120, 220 by means of at least one cable 130, 230, and a third step 306 of routing the at least one cable 130, 230 at least partly around a drive shaft 118, 218 of the drive unit 110, 210.

It should be appreciated that even though numerous characteristics and advantages of the present invention have been set forth in the foregoing description, together with details of the structure and function of the invention, the description is only illustrative and changes may be made in detail, especially in matters of shape, size

and arrangement of parts within the scope of the invention to the full extent indicated by the appended claims.

CLAIMS

1. A system for a swing door arrangement, comprising a drive unit (110, 210) and an auxiliary device (120, 220) being connected to said drive unit (110, 210) via at least one cable (130, 230), wherein the drive unit (110, 210) comprises a rotational drive shaft (118, 218) being connected to a door leaf (104, 204) and wherein the at least one cable (130, 230) is routed around the drive shaft (118, 218).

2. The system according to claim 1, wherein the auxiliary device (120, 220) is a sensor, a panic bar, a handle, or a lock.

3. The system according to claim 1 or 2, wherein the auxiliary device (120, 220) is mounted on the door leaf (104, 204).

4. The system according to any one of the preceding claims, wherein the drive unit (110, 210) is mounted inside a door frame (102, 202).

5. The system according to claim 4, wherein the rotational drive shaft (118, 218) is driving a pivot joint (106, 206) connecting the door leaf (104, 204) to the door frame (102, 202).

6. The system according to any one of claims 1-3, wherein the drive unit (110, 210) is mounted on the exterior side of a door frame (102, 202).

7. The system according to claim 6, wherein the rotational drive shaft (118, 218) is driving a linkage (240) connecting the door leaf (104, 204) to the door frame (102, 202).

8. The system according to claim 7, wherein the at least one cable (130, 230) is routed at least partly along the linkage (240).

9. The system according to any one of the preceding claims, wherein the at least one cable (230) is routed at least partly inside the door leaf (104, 204).

10. A swing door arrangement, comprising a door frame (102, 202), a swinging door leaf (104, 204), and a system according to any one of the preceding claims.

11. The swing door arrangement according to claim 10, wherein the drive unit (110, 210) is mounted at the door frame (102, 202) and the auxiliary device (120, 220) is mounted at the door leaf (104, 204).

12 .A method for providing a system for a swing door arrangement (100, 200), the method comprising:

providing a drive unit (110, 210) and an auxiliary device (120, 220),

connecting the drive unit (110, 210) to the auxiliary device (120, 220) by means of at least one cable (130, 230), and

routing the at least one cable (130, 230) at least partly around a drive shaft (118, 218) of the drive unit (110, 210).

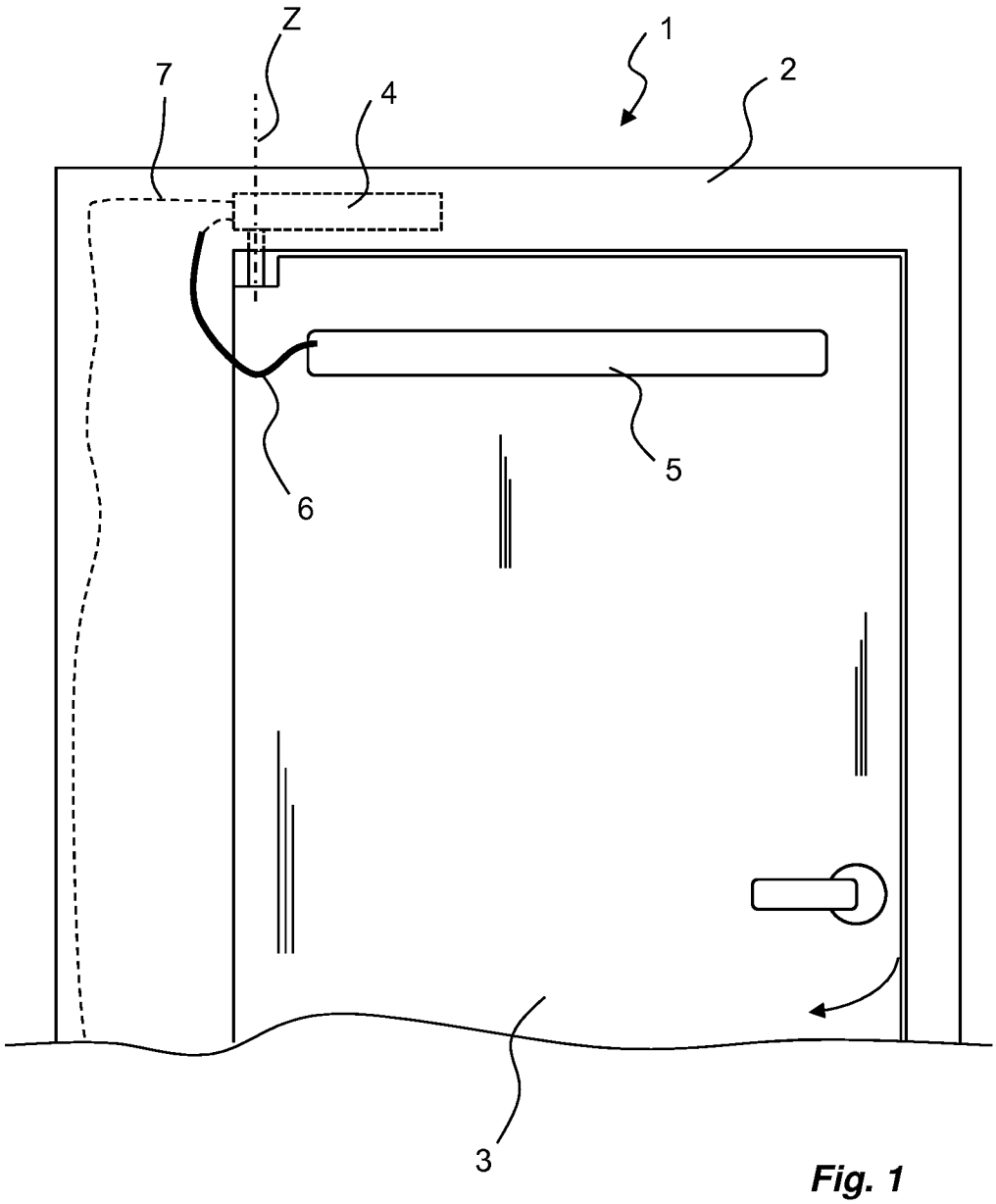


Fig. 1
PRIOR ART

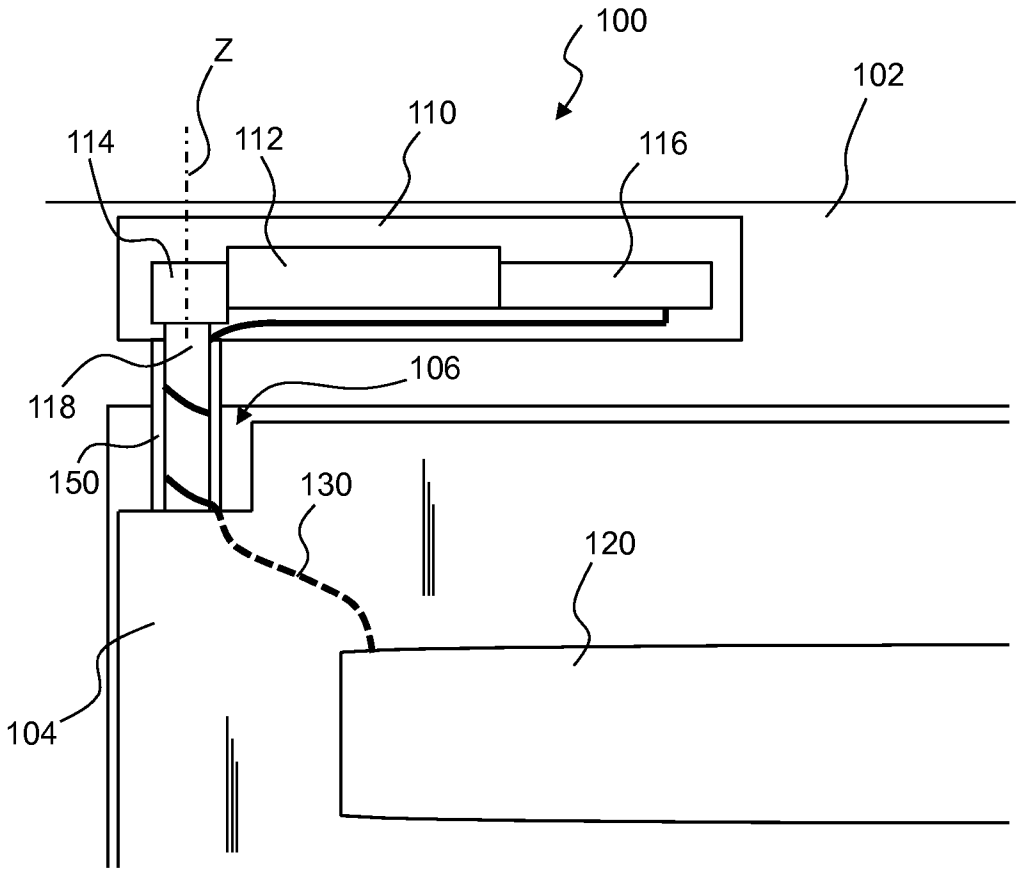


Fig. 2

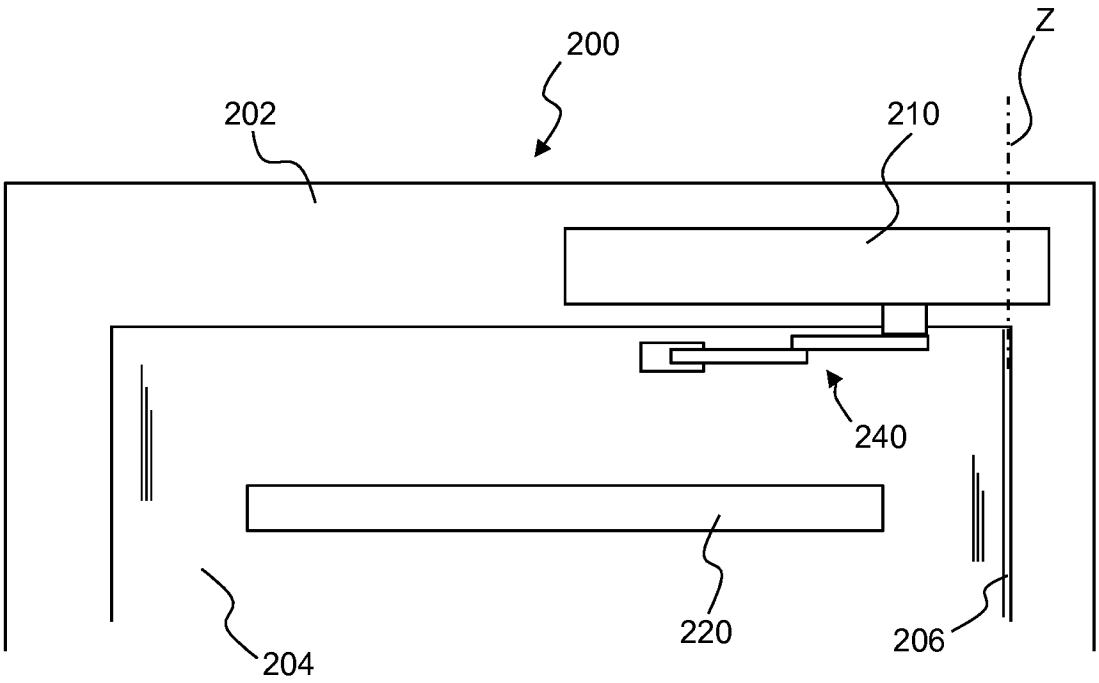

Z
200
202
210
240
220
204
206

Fig. 3

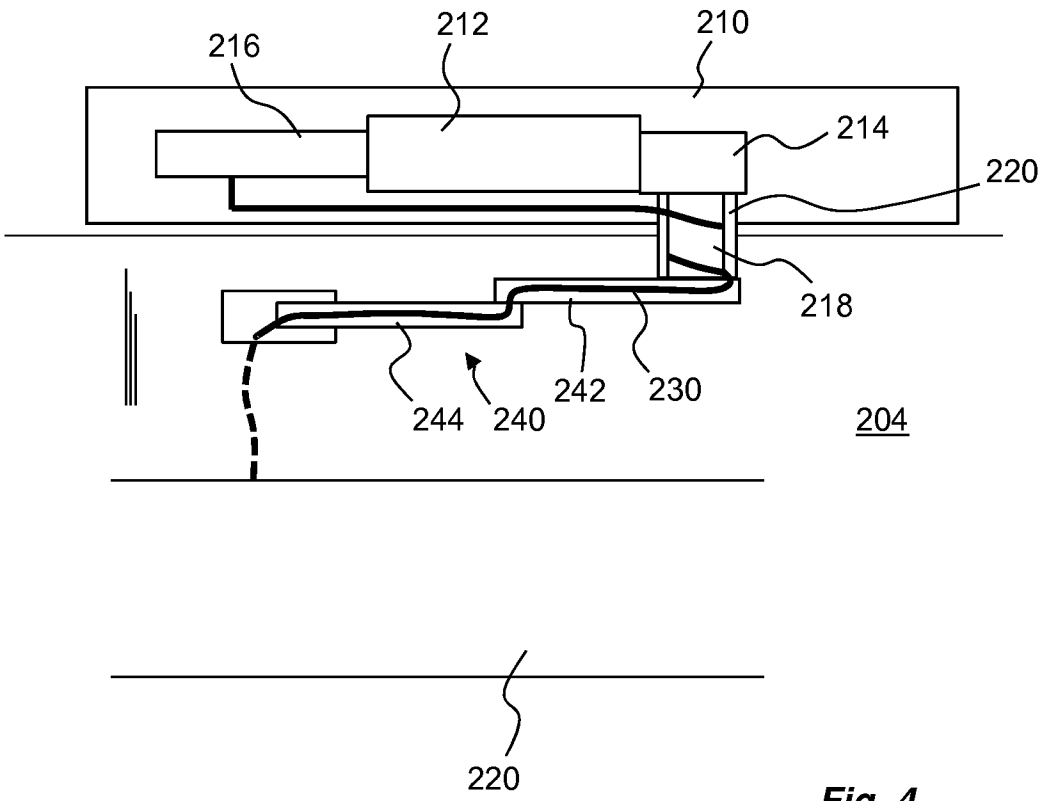

216
212
210
214
220
218
244
240
242
230
204
220

Fig. 4

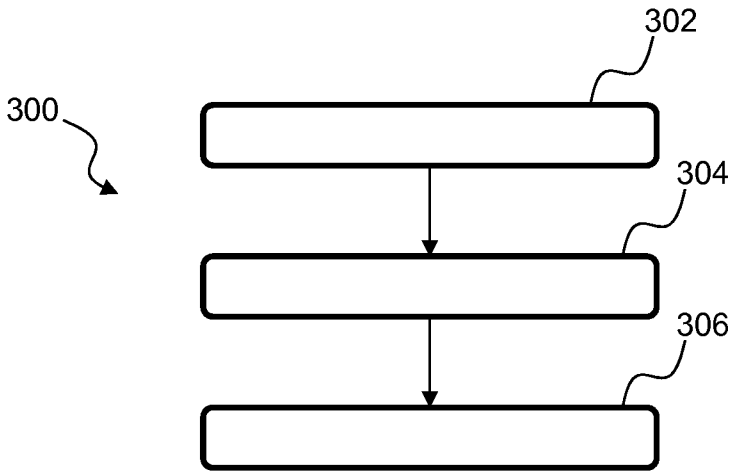


Fig. 5

INTERNATIONAL SEARCH REPORT

International application No
PCT/EP2018/059665

A. CLASSIFICATION OF SUBJECT MATTER
INV. E05F15/614 E05F15/63
ADD.

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)
E05F

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 practicable, search terms used)
EPO-Internal

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	EP 3 064 694 A1 (GEZE GMBH [DE]) 7 September 2016 (2016-09-07) paragraph [0006] paragraph [0007] paragraph [0033] paragraph [0055]; figure 20 -----	1-12
X	DE 10 2007 002848 A1 (GERHARD ECKERLE GMBH [DE]) 7 February 2008 (2008-02-07) paragraph [0039] - paragraph [0040] paragraph [0088]; figures 1-5 -----	1-3,9, 10,12

☐ Further documents are listed in the continuation of Box C.

☒ See patent family annex.

* Special categories of cited documents :

"A" document defining the general state of the art which is not considered to be of particular relevance

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"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

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"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art

"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
5 June 2018	19/06/2018

Name and mailing address of the ISA/	Authorized officer
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1

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No
PCT/EP2018/059665

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