

(12) **EUROPEAN PATENT APPLICATION**

(43) Date of publication:
22.12.2021 Bulletin 2021/51

(51) Int Cl.: **B66B 19/00** ^(2006.01) **B66B 5/00** ^(2006.01)

(21) Application number: **20386031.7**

(22) Date of filing: **15.06.2020**

(84) Designated Contracting States:
**AL 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 RS SE SI SK SM TR**
 Designated Extension States:
BA ME
 Designated Validation States:
KH MA MD TN

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(54) **BUILT-IN MOVING CARRIER PLATFORM AND METHOD OF SCANNING A SHAFT**

(57) This is an invention that refers to an integrated system and method of installing an elevator or any other similar lifting mechanism. It consists of a built-in platform, a method of recording the dimensions and all required

details from a shaft, using a coordinate measuring machine (CMM) and the manipulation of the collected data (feeding robotic installation, augmented reality (AR), conventional man installation etc).

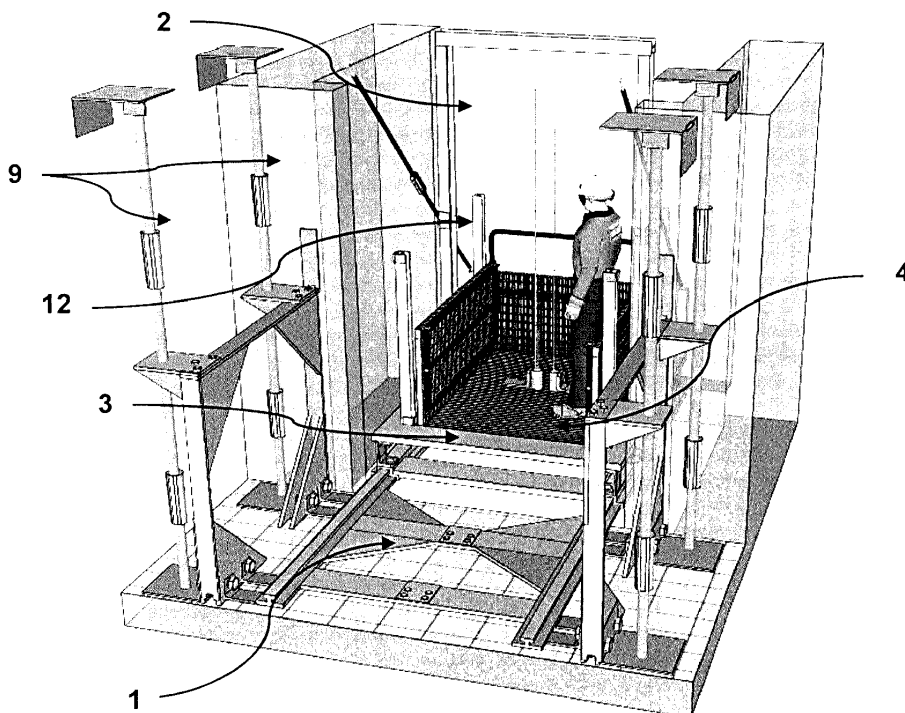


Figure 1.

Description

[0001] Present invention refers to an integrated system and method of installing an elevator or any other similar lifting mechanism. It consists of a built-in platform, a method of recording the dimensions and all required details from a shaft, using a coordinate measuring machine (CMM) and the manipulation of the collected data (feeding robotic installation, augmented reality (AR), conventional man installation etc). Following are described further details about the invention.

[0002] Elevators are placed in buildings and are a type of vertical transportation that moves people or/and goods between floors of a building. Millions of elevators are installed everyday around the world. Installing an elevator takes several days of work, depending the dimensions of the shaft and the specific features of each construction.

[0003] According to the state of the art, the elevator is installed into the shaft by using a scaffold which is previously installed in the shaft. Moreover, temporary platforms are arranged in order to assist the installers to place the several components, such as brackets on the walls or even the elevator machine on the top of the shaft. The main drawback of this method is the demanded time for installing and uninstalling the scaffold. Furthermore, each shaft is described by different specifications. It is crucial knowing not only the dimensions of the shaft, but also specific features such as abnormalities on the walls. It is common the walls of the shaft not being perfect vertical levels through the whole height.

[0004] As a background art is also taken into account several efforts of installations that do not demand the pre-installed scaffold. The main drawback in these cases is that at least a part of the cabin is used and usually is required a hook from the ceiling of the shaft, which limits opportunity of using them in special occasions.

[0005] The presented invention combines a built-in carrier platform, that can be used regardless the height of the building, a hoist mechanism that enables the vertical movement of the platform and a method of recording the shaft. The first part of the invention concerns the built-in platform and aims on eliminating the difficulties that the installers face. The scope of the second part, of using the CMM on the platform, is presenting an easy way of recording precisely the shaft, so the afterwards installation demands less effort.

[0006] Firstly, is described the built-in platform. It consists of the support frame (1), which can be placed in any level of the building, the overhead bridge (2), where could be also adjusted the pulley system (7), the carrosserie static support frame (3) and the carrosserie moving carrier (4). Underneath the moving carrier (4) is placed the hoist mechanism (6), which enables the platform of moving up and down. On the platform can be attached the CMM and while the platform descends the CMM is able to scan the shaft.

[0007] As has already been mentioned, the platform can be placed in any level of the building, but it is useful

the fact that it can be placed on the upper floor level, so the moving carrier (4) goes through the whole shaft. The telescopic bars (9) ensure the stability of the construction regardless the height of the storey, since they are regulated to several heights. The stability is ensured since they use the floor and the roof of the corresponding storey. The support frame (1) consists of adjustable parts in order to fit in any opening width. The carrosserie moving carrier (4) slides in the support frame (1) and then is docked and locked. There is also a joint (12) on the overhead bridge (2), so it can be folded in cases that the opening of the shaft is low and then is unfolded and secured in the vertical position. The moving carrier (4) is made of a durable material and its design ensures that it withstands the applied loads, and for ensuring the safety of the worker, balustrades (11) are placed at least at three sides. As is shown in Figure 3, the side frames (10) of the moving carrier can be foldable, as the balustrades (11), in order to fit better in a variety of shafts. The hoist mechanism (6) and the pulley (7) enables the vertical movement of the platform. Descending can be gravitational, assisted (speed control) either by oil speed valve or small motor. After the appropriate configuration the elevator's motor could be also used for ascending and descending the platform. Any unintentional sideway movements can be eliminated by the alignment casters (5), which are expanded below the moving carrier.

[0008] The CMM (8) is placed on the carrosserie and is secured, so it remains still concerning the carrosserie as the corresponding reference point. The moving carrier starts going down with CMM machine on it and the shaft is recorded. An additional sensor coupled with the CMM can be placed in any fixed position in the shaft. The purpose of this additional sensor is to provide corrections in data regarding the position of CMM, since the CMM may be subjected to disturbances (sudden lateral movements, obstacles) beyond the range that CMM software can handle.

[0009] The collected data from the CMM are available to be manipulated by different ways. The collected data can be used by the installers or feed information to a robotic system that executes the installation or even be transferred to an augmented reality (AR) system, this system is further used during the installation and points out the right way of installing each component in the construction.

Claims

1. The "Built-in moving carrier platform and method of scanning a shaft" describes an integrated system and method of installing an elevator or any other similar lifting mechanism. It consists of the built-in platform, which is alternatively combined with the CMM and the manipulation of the collected data. It is **characterized in that** it is a modular and self-standing platform (fits in any building and no particular prep-

aration is demanded), that assists both recording the dimensions and the details of the shaft through a CMM, manipulate the recorded data (information for the installers, feeding robotic installation, augmented reality (AR) etc) and installing the components of an elevator or any other similar lifting mechanism.

2. The invention according to Claim 1, is **characterized in that** the platform consists of three main parts:

- a. The support frame (1)
- b. The overhead bridge (2)
- c. The moving carrier (4)

3. The invention according to Claim 1-2, **characterized in that** it is easily installed in any floor of the building and its installation does not demand penetration drilling or any extra features in the building and especially the shaft, such as hooks, guide beams etc.

4. The invention according to Claim 1-3, **characterized in that** the overhead bridge is folded in cases that the opening of the shaft is low and then is unfolded and secured in the vertical position.

5. The invention according to Claim 1-4, **characterized in that** the telescopic bars (9) ensure the stability of the construction, since they use the floor and the roof of the corresponding storey, regardless the height of the storey, since they are regulated to several heights.

6. The invention according to Claim 1-5, **characterized in that** the moving carrier (4) ensures the safety of the worker by balustrades (11) which are placed at least at three sides and the side frames (10) of the moving carrier can be foldable, as the balustrades (11), in order to fit better in a variety of shafts.

7. The invention according to Claim 1-6, **characterized in that** the hoist mechanism (6) and the pulley (7) enables the vertical movement of the platform. Descending can be gravitational, assisted (speed control) either by oil speed valve or small motor. After the appropriate configuration the elevator's motor could be also used for ascending and descending the platform.

8. The invention according to Claim 1-7, **characterized in that** any unintentional sideways movements can be eliminated by the alignment casters (5), which are expanded below the moving carrier.

9. The invention according to Claim 1, is **characterized in that** an additional sensor coupled with the CMM can be placed in any fixed position in the shaft to provide corrections in data regarding the position of CMM, in case of disturbances beyond the range that

CMM software can handle.

10. The invention according to Claim 1 and 9, is **characterized in that** the collected data from the CMM are available to be transferred to an augmented reality (AR) system or a robotic system.

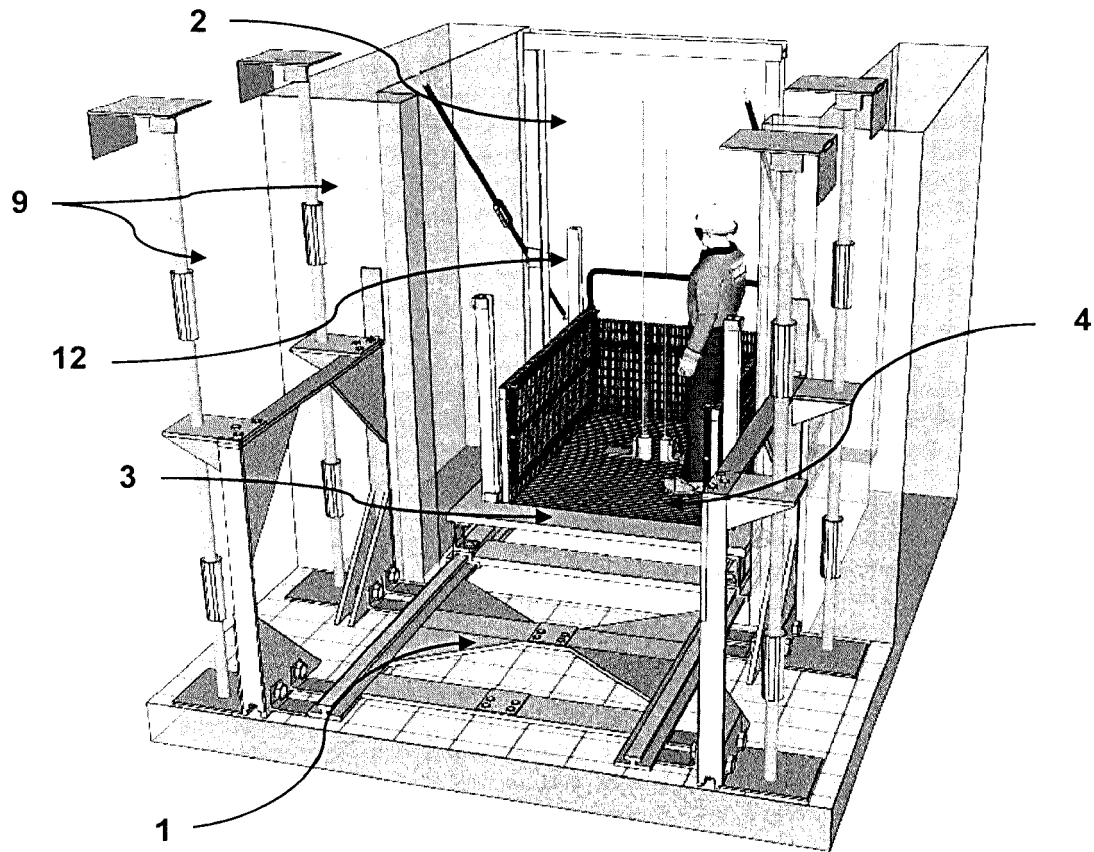


Figure 1.

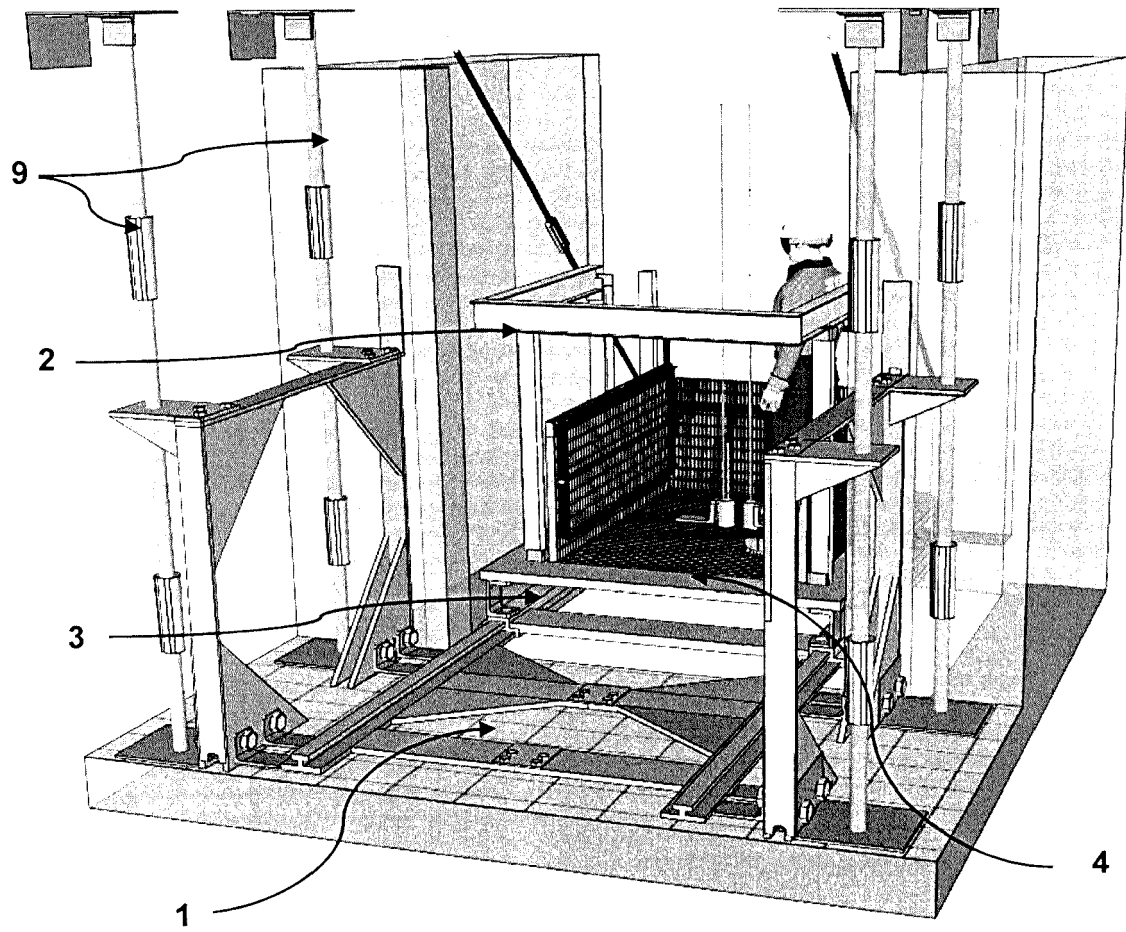


Figure 2.

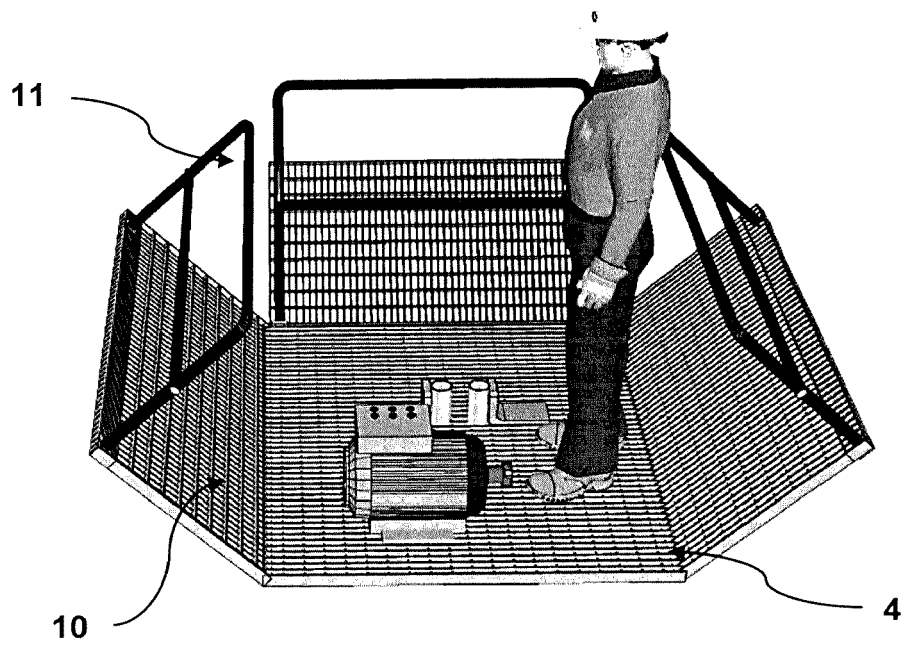


Figure 3.

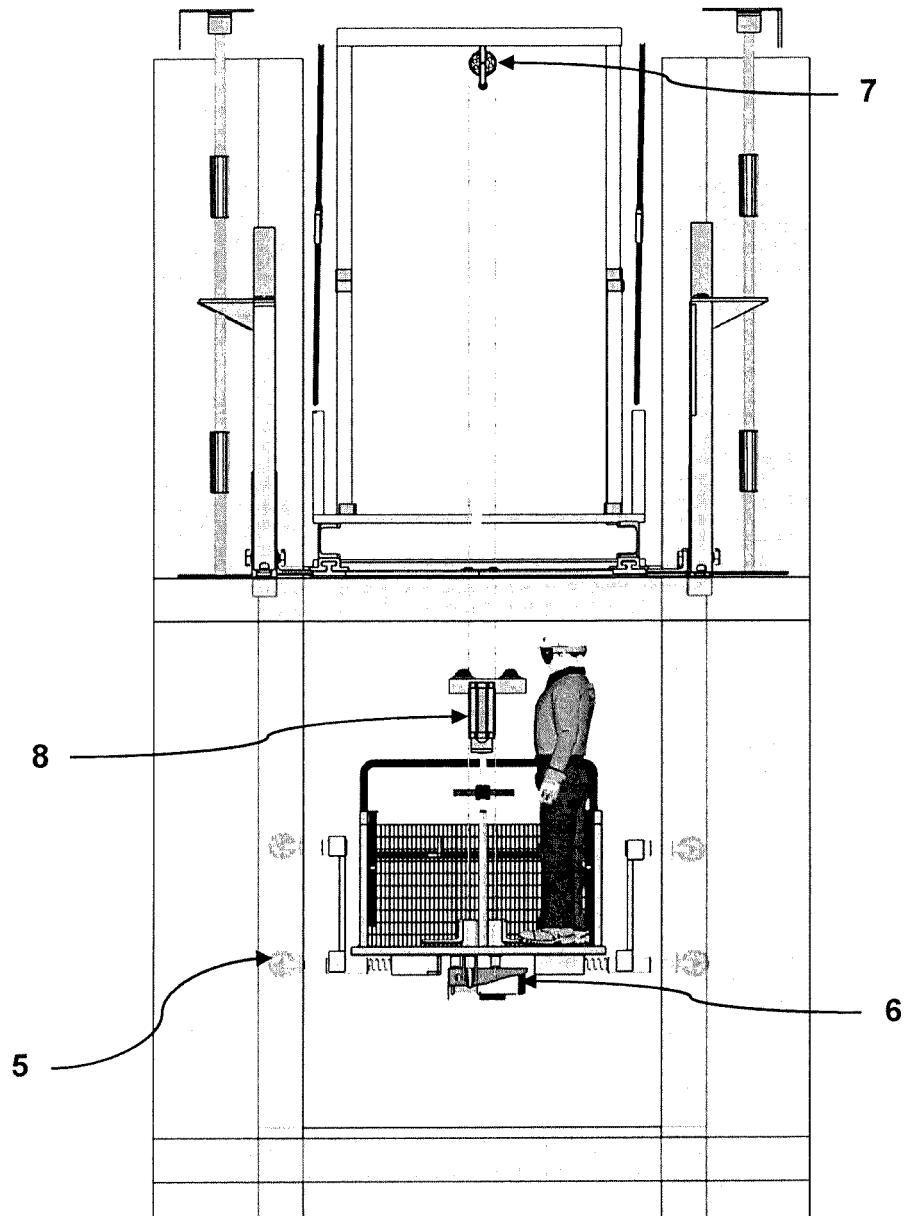


Figure 4.



EUROPEAN SEARCH REPORT

Application Number
EP 20 38 6031

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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			
Place of search The Hague		Date of completion of the search 3 December 2020	Examiner Dogantan, Umut H.
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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EPO FORM 1503 03.82 (P04C01)

**ANNEX TO THE EUROPEAN SEARCH REPORT
ON EUROPEAN PATENT APPLICATION NO.**

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This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report.
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