



US 20180016802A1

(19) **United States**(12) **Patent Application Publication**
CHO et al.(10) **Pub. No.: US 2018/0016802 A1**(43) **Pub. Date: Jan. 18, 2018**(54) **CAGE APPARATUS FOR CONSTRUCTION**(30) **Foreign Application Priority Data**(71) Applicant: **KOREA UNIVERSITY RESEARCH
AND BUSINESS FOUNDATION,**
Seoul (KR)

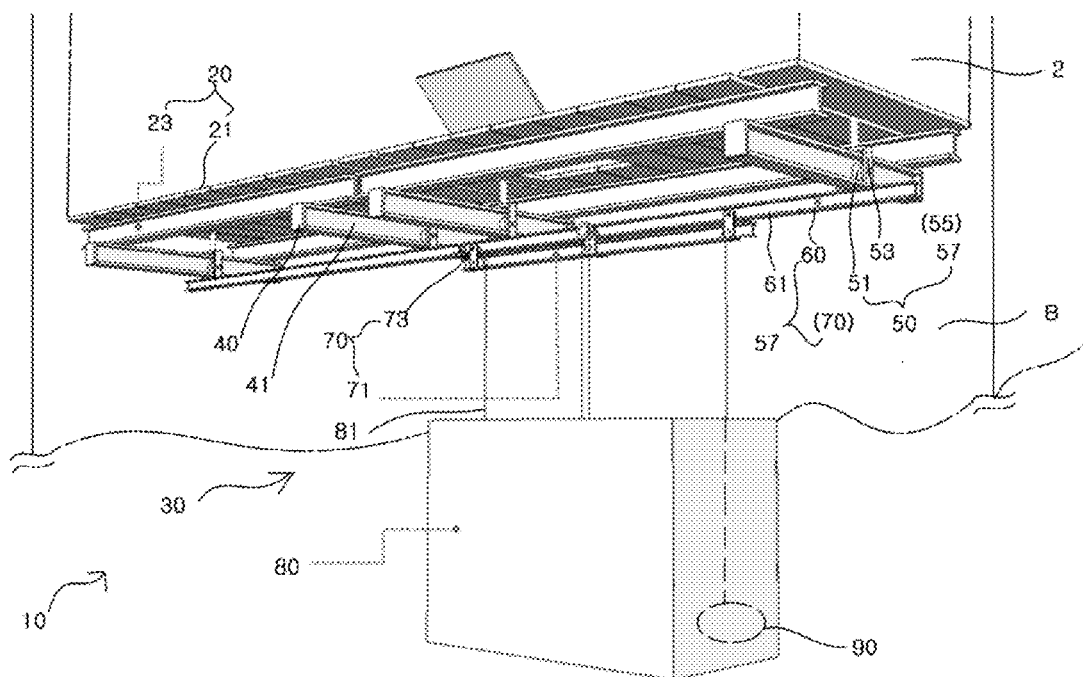
Jul. 15, 2016 (KR) 10-2016-0089604

Publication Classification(72) Inventors: **Hun Hee CHO**, Seoul (KR); **Kyung In
KANG**, Seoul (KR); **Min Ju KIM**,
Seoul (KR); **Tae Hoon KIM**, Seoul
(KR); **Jun Sok CHOI**, Seoul (KR); **Jae
Soo LEE**, Guri-si (KR); **Ho BAIK**,
Seongnam-si (KR); **Sangheon LEE**,
Seoul (KR)(51) **Int. Cl.****E04G 21/32** (2006.01)**E04G 3/28** (2006.01)**E04G 3/00** (2006.01)**E04G 21/00** (2006.01)(52) **U.S. Cl.**CPC **E04G 21/3247** (2013.01); **E04G 3/28**
(2013.01); **E04G 3/00** (2013.01); **E04G**
2003/283 (2013.01); **E04G 21/00** (2013.01)(73) Assignee: **KOREA UNIVERSITY RESEARCH
AND BUSINESS FOUNDATION,**
Seoul (KR)

(57)

ABSTRACT

Disclosed herein is a cage apparatus for construction, which includes: a cage base having a base frame supporting a base foothold to carry out frame work of a building; and a cage gondola unit arranged to be operated relative to the cage base to carry out exterior finish work of the building.

(21) Appl. No.: **15/650,428**(22) Filed: **Jul. 14, 2017**

THE

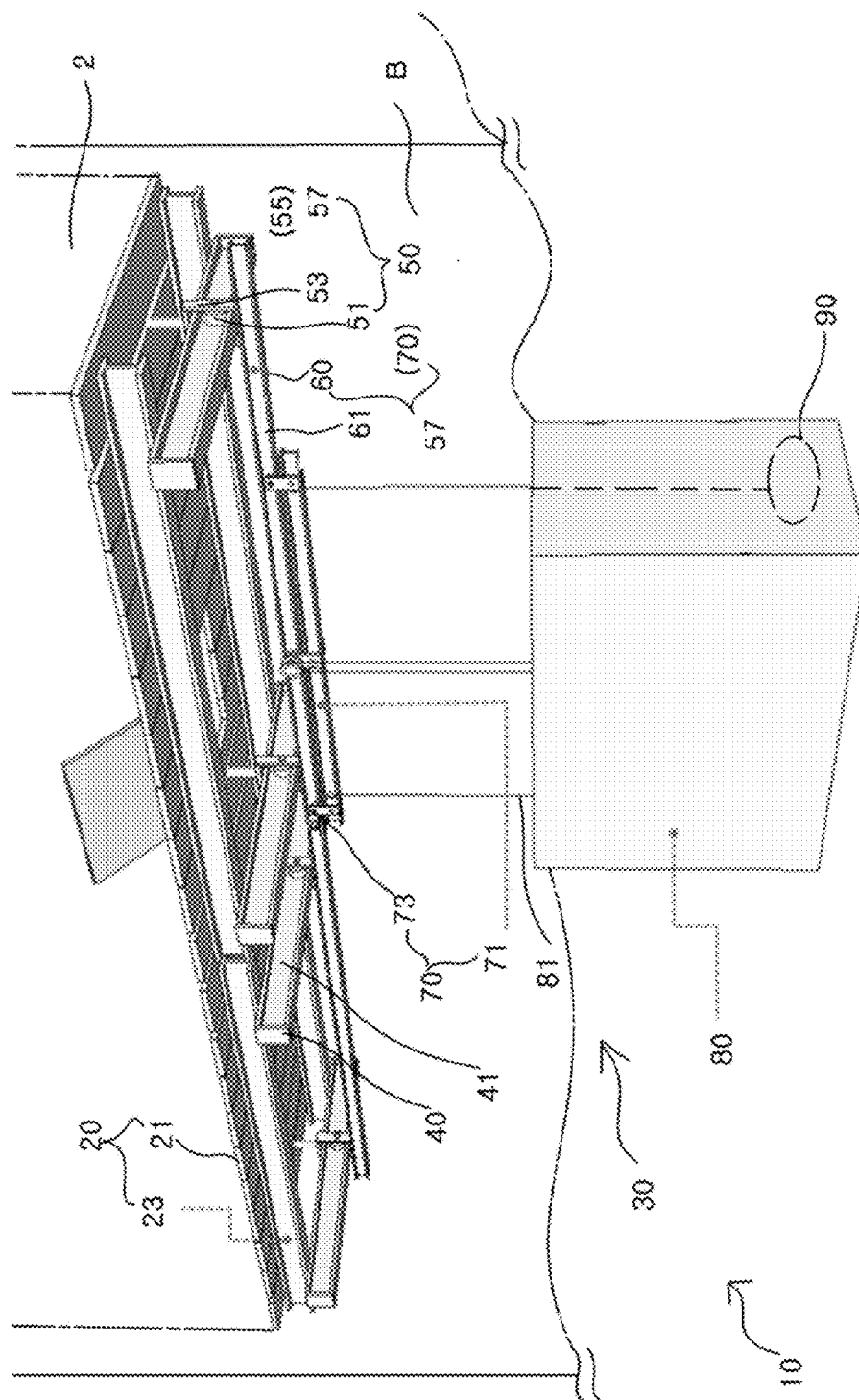


FIG. 3A

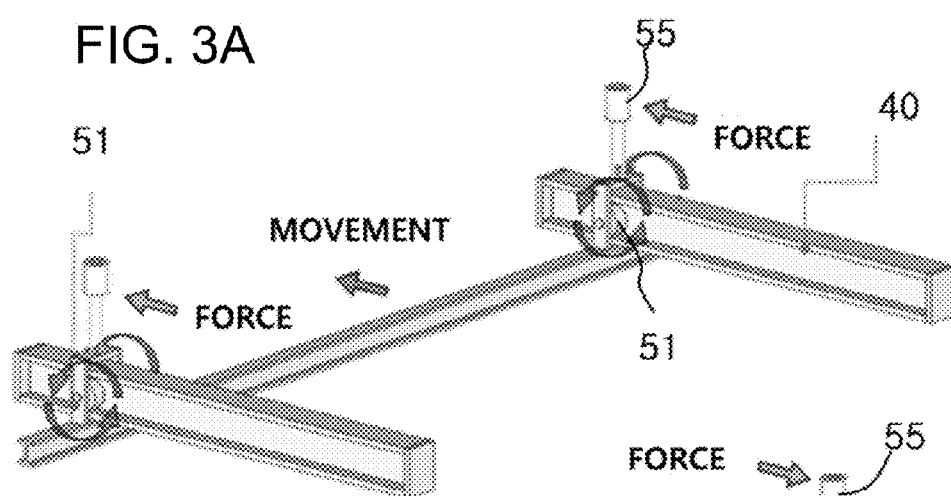


FIG. 3B

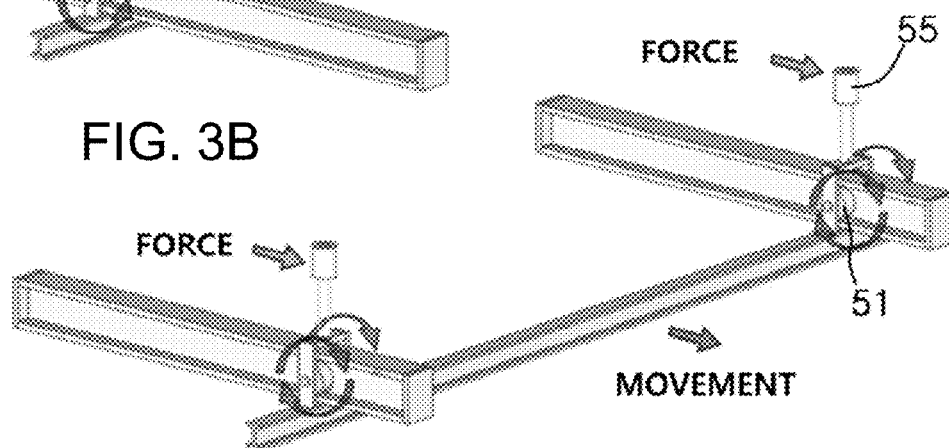


FIG. 4A

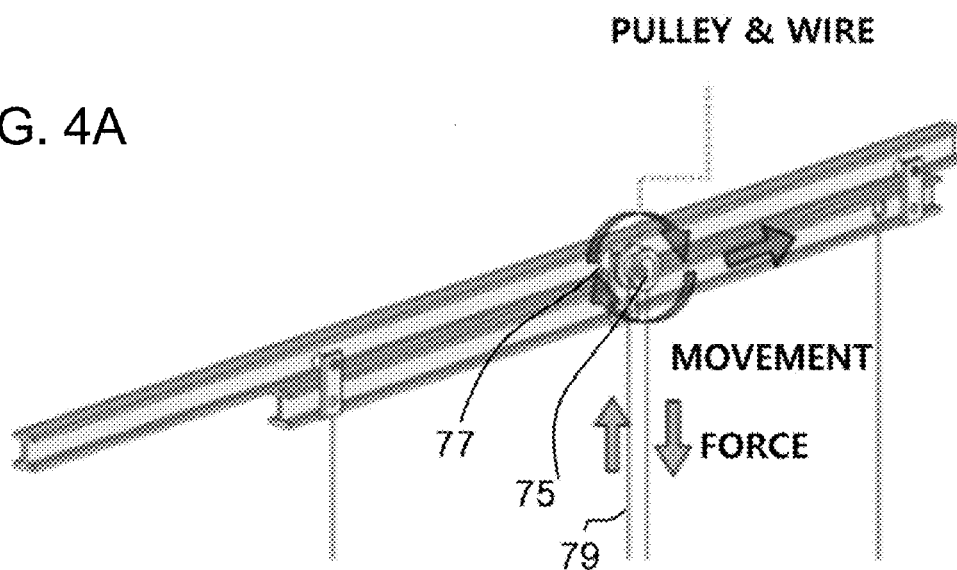


FIG. 4B

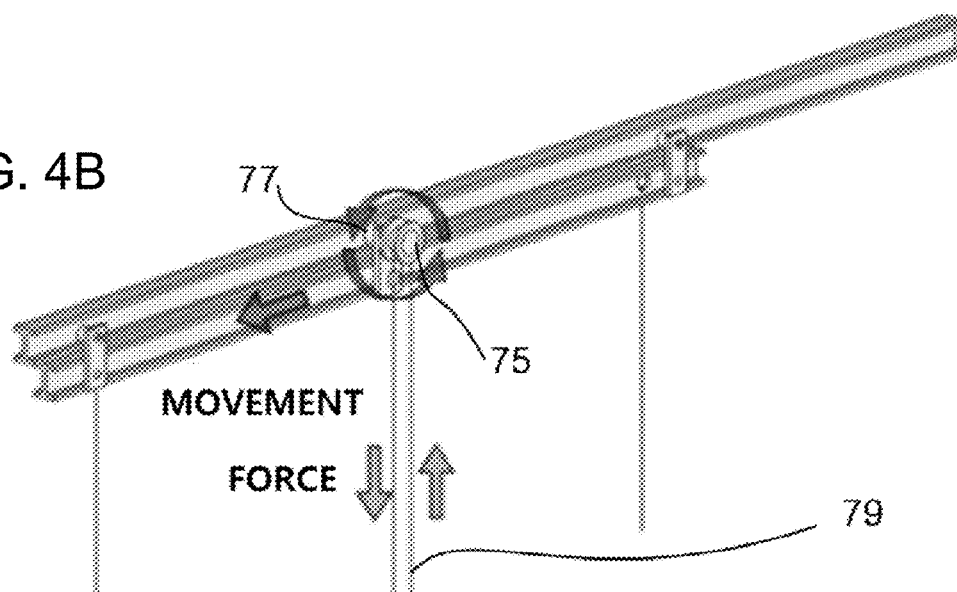


FIG. 5A

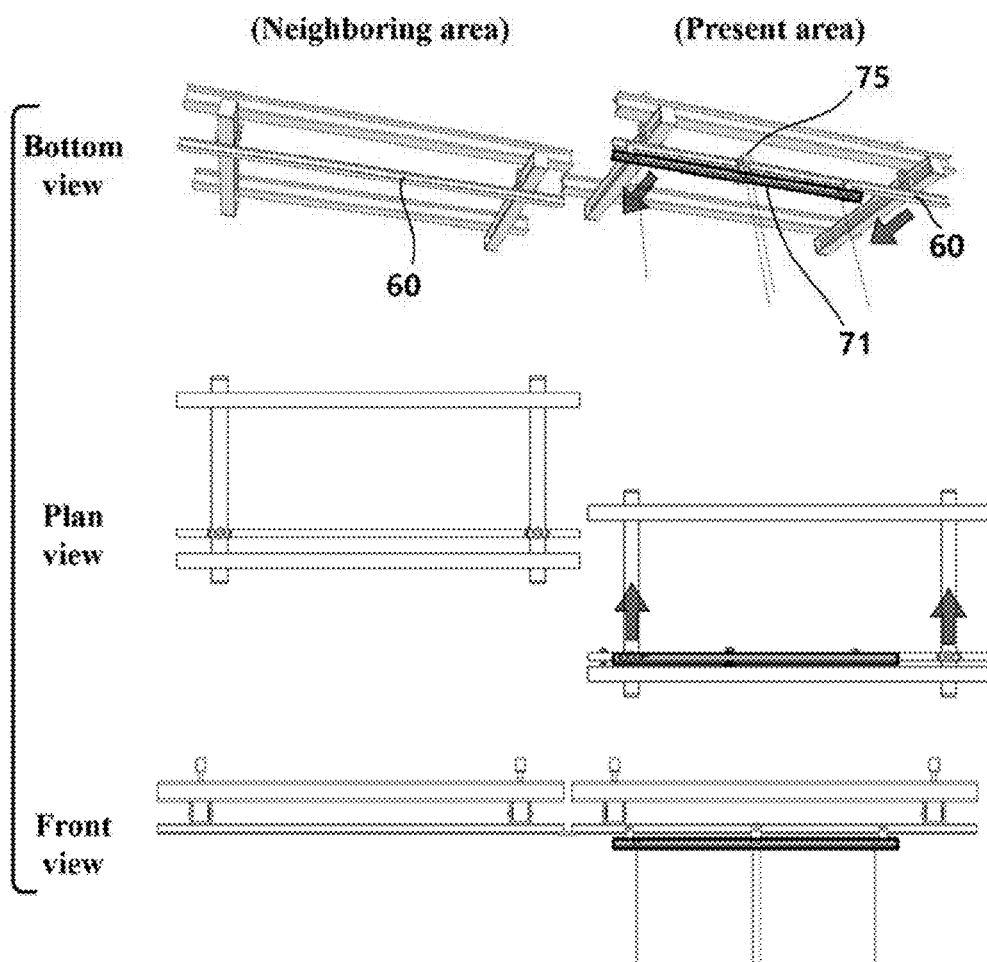


FIG. 5B

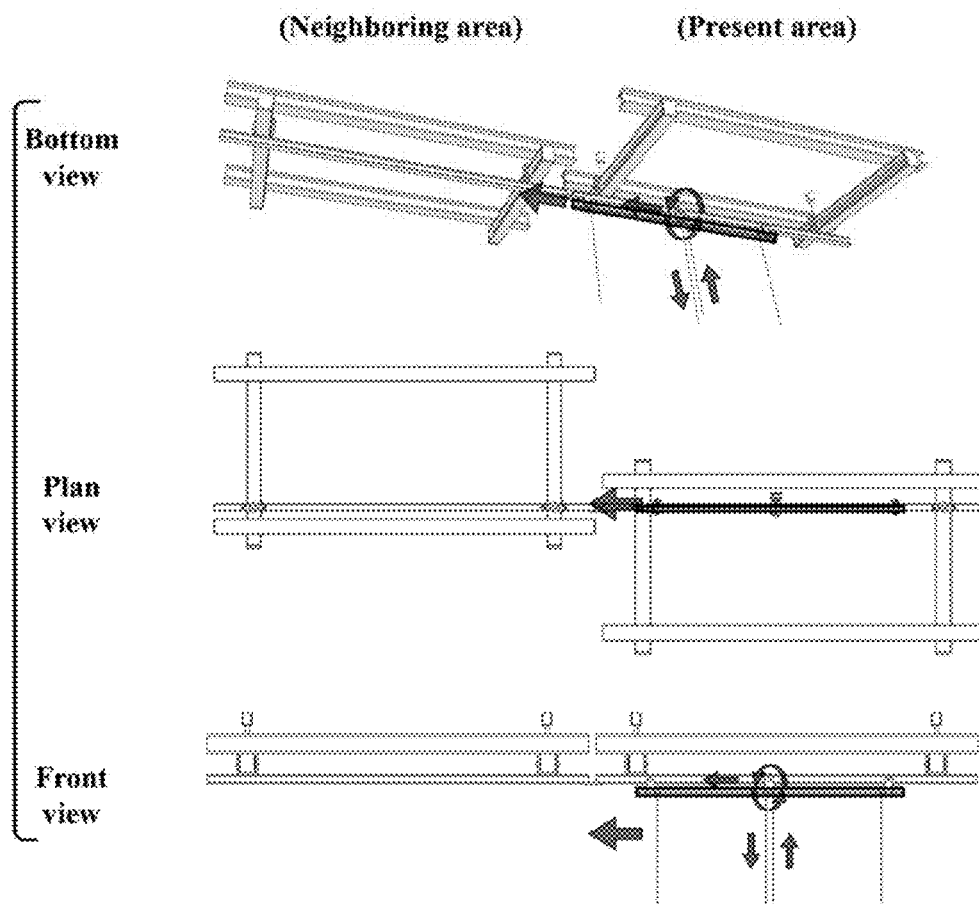
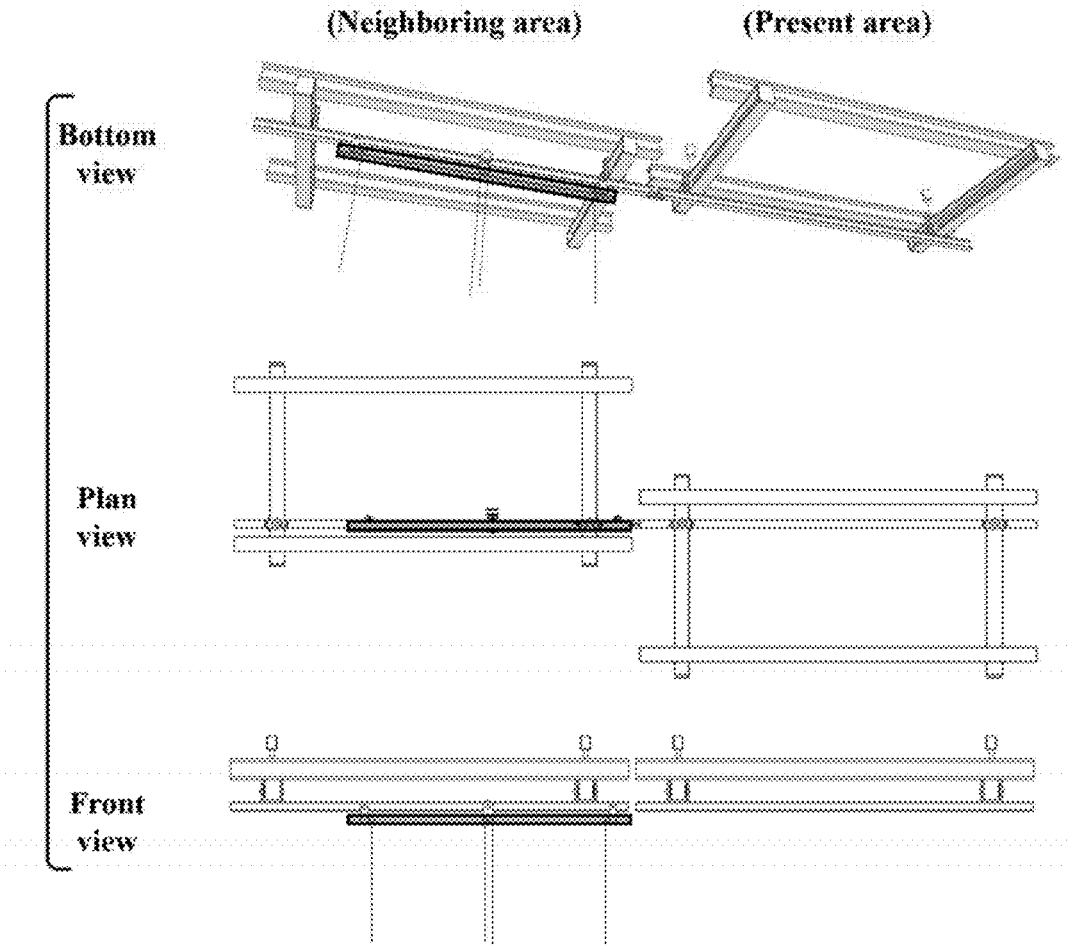


FIG. 5C



CAGE APPARATUS FOR CONSTRUCTION

CROSS-REFERENCE TO RELATED APPLICATIONS

[0001] This application claims the benefit of Korean Patent Application No. 10-2016-0089604, filed on Jul. 15, 2016 in the Korean Intellectual Property Office, which is incorporated herein by reference in its entirety.

BACKGROUND OF THE INVENTION

Field of the Invention

[0002] The present invention relates to a cage apparatus for construction, and more particularly, to a structure for connecting a cage for construction with a gondola for exterior finish work in order to carry out frame work and exterior finish work to be stacked up.

Background Art

[0003] In general, finishing work for an outer wall of a high-rise building is carried out on a gondola when support beams are mounted on a rooftop and the gondola is hung up after frame work is completed. Because such exterior finish work before frame work is finished cannot be started, there is a process gap between the two works, and it may cause an increase of the entire construction period of time.

[0004] Therefore, in some of construction sites in Korea, in order to carry out frame work and exterior finish work at the same time, a method of adding a work plate of one step or two steps below a cage for construction or a method of additionally installing a cage for finishing work of an outer wall below a cage for frame work is adopted.

[0005] However, the method of adding the lower work plate has a limitation in adding the number of steps of work plates due to an increase of cage load and an increase of construction costs. Moreover, the method of adding the lower work plate has additional disadvantage in that frame work may be delayed and the entire construction period of time is increased because it is impossible to raise the cage to an upper layer if the construction-per-layer periods of frame work and exterior finish work are not synchronized.

[0006] The method of additionally installing a cage requires a lot of time to install and dismantle the additional cage and causes an increase of construction costs. Particularly, the two methods to carry out construction work by the unit of a layer may cause waste of productivity and an increase of construction costs because workers for exterior finish work can secure just a work amount of one layer during the construction period per layer. Therefore, technology for minimizing additional costs, allowing the workers for exterior finish work to secure a sufficient work amount, and supporting concurrent construction of frame work and exterior finish work is required.

SUMMARY OF THE INVENTION

[0007] Accordingly, the present invention has been made in view of the above-mentioned problems occurring in the prior art, and it is an object of the present invention to provide a cage apparatus for construction, which allows economic concurrent construction of frame work and exterior finish work by installing gondola support beams, which are movable in all directions, below a cage for construction.

[0008] To accomplish the above object, according to the present invention, there is provided a cage apparatus for construction, which includes a cage base having a base frame supporting a base foothold to carry out frame work of a building, further including a cage gondola unit arranged to be operated relative to the cage base to carry out exterior finish work of the building.

[0009] In the cage apparatus, the cage gondola unit may comprise: a gondola unit main frame fixed and mounted on the cage frame; a gondola unit main operating part, whose at least a part is arranged on the gondola unit main frame to carry out relative operation; and a gondola connected to the gondola unit main operating part to allow a worker to get on the gondola to carry out exterior finish work of the building.

[0010] In the cage apparatus, a plurality of the base main frames and the gondola unit main frames may be disposed.

[0011] In the cage apparatus, main frame rails may be disposed on the gondola unit main frame in a longitudinal direction, and the gondola unit main operating part 50 may comprise: a main operating part wheels which are operable along the main frame rails; a main operating part wheel bracket connected with the main operating part wheels; and a main operating part bracket handle which enables the worker to grip it to transfer power and is connected to the main operating part wheel bracket.

[0012] In the cage apparatus, the cage gondola unit may further comprise: a gondola unit subsection part which operates the gondola in the direction perpendicular to the gondola unit main frame between the gondola unit main operating part and the gondola.

[0013] In the cage apparatus, the gondola unit subsection part may comprise: a gondola unit sub-frame which is connected with the main operating part wheel bracket and has a longitudinal direction perpendicular to the gondola unit main frame; a gondola unit sub-operating part which operates the gondola along the gondola unit sub-frame in the longitudinal direction of the gondola unit sub-frame.

[0014] In the cage apparatus, the gondola unit sub-operating part may comprise: a subsidiary operation frame arranged to be parallel with the gondola unit sub-frame; and a subsidiary operation wheel operable in a longitudinal direction of the subsidiary operation frame, and the gondola may be connected with the subsidiary operation frame through a gondola wire.

[0015] In the cage apparatus, a plurality of the subsidiary operation wheels may be disposed.

[0016] In the cage apparatus, the gondola unit sub-operating part may further comprise a vertical operation part which operates the gondola in a vertical direction.

[0017] In the cage apparatus, the gondola wire may have an end connected to the gondola and the other end wound on the vertical operation part, and the vertical operation part is a motor for winding the gondola wire.

[0018] In the cage apparatus, the gondola sub-operating part may comprise: a horizontal operation pulley arranged on the subsidiary operation frame to be rotatable; a horizontal operation wheel operated in a longitudinal direction of the gondola unit sub-frame and connected with the horizontal operation pulley; and a horizontal operation wire which is wound on the horizontal operation pulley and provides rotary power to the horizontal operation pulley according to a tension direction to rotate the horizontal operation wheel.

[0019] According to a preferred embodiment of the present invention, the cage apparatus for construction can reduce a construction period of time because exterior finish work can be carried out at the same time with frame work, compared with the conventional construction method to carry out exterior finish work after completing frame work. Furthermore, the cage apparatus for construction can remove waste of productivity because allowing workers to secure a sufficient work amount, differently from the conventional method of adding work plate or the conventional method of additionally installing a cage that carry out construction work by the unit of layer. Additionally, the cage apparatus for construction can secure economic feasibility because it can be easily mounted to the existing building system.

BRIEF DESCRIPTION OF THE DRAWINGS

[0020] The above and other objects, features and advantages of the present invention will be apparent from the following detailed description of the preferred embodiments of the invention in conjunction with the accompanying drawings, in which:

[0021] FIG. 1 is a block diagram of a cage and a gondola for construction which are connected with each other in a connection structure;

[0022] FIG. 2 is a block diagram of the connection structure between the cage for construction and gondola support beams;

[0023] FIGS. 3A and 3B are, respectively, a view showing an operational state of back-and-forth movable support beams;

[0024] FIGS. 4A and 4B are, respectively, a view showing an operational state of laterally movable support beams; and

[0025] FIGS. 5A, 5B and 5C are, respectively, a view showing an operational state of a movement process of the gondola between cages for construction.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

[0026] A cage apparatus for construction according to a preferred embodiment of the present invention includes a cage disposed at an upper part for frame work and a gondola disposed at a lower part for exterior finish work. Moreover, the present invention relates to a connection structure of a cage and a gondola in order to carry out concurrent construction of frame work and exterior finish work, and the connection structure is illustrated in FIG. 1.

[0027] FIG. 2 illustrates the connection structure of support beams between the cage for construction and the gondola in detail, and the connection structure includes back-and-forth movable support beams and laterally movable support beams disposed below the back-and-forth movable support beams.

[0028] In more detail, the cage apparatus 10 for construction according to the preferred embodiment of the present invention includes: a cage base 20, which is arranged on a frame cage 2 for carry out frame work of a building B and has a base frame for supporting a base foothold; and a cage gondola unit 30 arranged to be operated relative to the cage base 20 to carry out exterior finish work of the building B.

[0029] The cage apparatus for construction includes an elevator device (not shown) and components to make frame work possible at the upper part, but descriptions of the

components for frame work will be omitted because this embodiment puts emphasis on the cage gondola unit 30 for exterior finish work.

[0030] The cage apparatus 10 for construction includes the cage base 20, and the cage base 20 is connected to the frame cage 2 of the cage apparatus 10. In addition, the cage base 20 connected and arranged to a bottom side of the frame cage 2 includes a base foothold 21 and a base main frame 23.

[0031] The base main frame 23 is a bottom structure of the frame cage 2, and the base foothold 21 is arranged on one side of the base main frame 23 such that a worker can step and move thereon.

[0032] The cage gondola unit 30 is arranged to be operated relative to the cage base 20 in order to allow the worker to carry out exterior finish work of the building B. The cage gondola unit 30 includes a gondola unit main frame 40, a gondola unit main operating part 50, and a gondola 80. The gondola unit main frame 40 is fixed and mounted on the cage frame, at least a part of the gondola unit main operating part 50 is arranged on the gondola unit main frame 50 to carry out relative operation, and the gondola 80 is connected to the gondola unit main operating part 50 to allow the worker to get on the gondola 80 to carry out exterior finish work of the building.

[0033] In this embodiment, the number of the base main frames 23 and the number of the gondola unit main frames may be varied, but preferably, a plurality of the base main frames and the gondola unit main frame 40 are disposed in order to make stable operation possible. That is, a plurality of the base main frames 23 are arranged on the outer face of the building B to be spaced apart from each other in a parallel direction, and the gondola unit main frames 40 of the cage gondola unit 30 are arranged below the base main frames 23.

[0034] The gondola unit main frames 40 are arranged longitudinally to be spaced apart from each other in a direction to be away from the outer face of the building B. In this embodiment, each of the gondola unit main frames 40 has an I-beam structure and includes main frame rails 41 disposed at the flank thereof. That is, the gondola unit main frames 40 has the main frame rails 41 formed in the longitudinal direction, and at least a part of the gondola unit main operating part 50 is operated along the main frame rails 41.

[0035] The gondola unit main operating part 50 includes a main operating part wheel 51, a main operating part wheel bracket 53, another main operating part wheel 51, and a main operating part bracket handle 55.

[0036] The main operating part wheels 51 are operable along the main frame rails 41. Preferably, the main operating part wheels 51 are respectively arranged at both sides of the gondola unit main frame 40 so as to respectively engage with the main frame rails formed at both sides of the gondola unit main frame 40 and respectively rotate and move along the main frame rails 41.

[0037] The main operating part wheel bracket 53 is connected with the main operating part wheels 51. The main operating part wheel bracket 53 is formed in the shape of '□' so as to connect the main operating part wheels 51 arranged at both sides thereof. In this instance, both ends of the main operating part wheel bracket 53 are not free ends but connected to a gondola unit subsection part 57 which will be described later.

[0038] The main operating part bracket handle 55 enables the worker to grip it to transfer power, and is connected to the main operating part wheel bracket 53. The main operating part bracket handle 55 has a structure that protrudes toward the upper end from an upper surface of the 'C'-shaped main operating part bracket 53.

[0039] The worker presses the main operating part bracket handle 55 so that the main operating part wheels 51 can be operated in the longitudinal direction of the gondola unit main frame 40.

[0040] In the meantime, the cage gondola unit 30 further includes the gondola unit subsection part 57. The gondola unit subsection part 57 can operate the gondola in the direction perpendicular to the gondola unit main frame 40 between the gondola unit main operating part 50 and the gondola 80.

[0041] The gondola unit subsection part 57 includes a gondola unit sub-frame 60 and a gondola unit sub-operating part 70.

[0042] The gondola unit sub-frame 60 is connected with the main operating part wheel bracket 53 and has a longitudinal direction perpendicular to the gondola unit main frame 40. The gondola unit sub-frame 60 is arranged in a vertical direction to the gondola unit main frame 40 to carry out relative operation to the gondola unit main frame 40, and in this instance, the longitudinal directions of the gondola unit sub-frame 60 and the gondola unit main frame 40 are vertical to each other.

[0043] Both ends of the 'C'-shaped main operating part bracket 53 are fixed and connected to the gondola unit sub-frame 60, such that the main operating part wheels 51 are arranged to rotate on a rotary shaft of the main operating part bracket 53 and are operated together with the gondola unit sub-frame 60.

[0044] Moreover, the gondola unit sub-operating part 70 operates the gondola 80 along the gondola unit sub-frame 60 in the longitudinal direction of the gondola unit sub-frame 60. The gondola unit sub-operating part 70 includes a subsidiary operation frame 71 and a subsidiary operation wheel 73.

[0045] The subsidiary operation frame 71 is arranged to be parallel with the gondola unit sub-frame 60, and the subsidiary operation frame 71 and the gondola unit sub-frame 60 are arranged to have longitudinal directions which are parallel with each other. In this embodiment, the subsidiary operation frame 71 has an I-beam structure, and has subsidiary operation frame rails 72 formed at both sides thereof.

[0046] The subsidiary operation wheel 73 is operable in the longitudinal direction of the subsidiary operation frame 71, namely, may be operated along the subsidiary operation frame rails 72 formed at both sides of the subsidiary operation frame 71.

[0047] In this embodiment, a plurality of the subsidiary operation wheels 73 are disposed. The subsidiary operation wheels 73 are equally disposed in the longitudinal direction of the subsidiary operation frame 71 such that the gondola 80 can move stably.

[0048] The gondola 80 is connected with the subsidiary operation frame 71 through a gondola wire 81. An end of the gondola wire 81 is connected to the subsidiary operation frame 71, and the other end is connected with a vertical operation part 90 arranged on the gondola 80.

[0049] In the meantime, an end of the gondola wire 81 is connected to the gondola and the other end is wound on the

vertical operation part 90, and the vertical operation part 90 may be a motor for winding the gondola wire. That is, the vertical operation part 90 may be a driving part, such as a winch motor, and may be operated to wind or release the gondola wire 81 so that the gondola 80 can be operated in the vertical direction. Therefore, the vertical operation part 90 can be operated straightly in the direction to be perpendicular to the ground.

[0050] Furthermore, the gondola unit sub-operating part 70 includes a horizontal operation pulley 75, a horizontal operation wheel 77 and a horizontal operation wire 79.

[0051] The horizontal operation pulley 75 is arranged on the subsidiary operation frame 71 to be rotatable, and the horizontal operation wheel 77 is operated in a longitudinal direction of the gondola unit sub-frame 60 and is connected with the horizontal operation pulley 75. The horizontal operation wire 79 is wound on the horizontal operation pulley 75 and provides rotary power to the horizontal operation pulley 75 according to a tension direction to rotate the horizontal operation wheel 77. That is, when the worker pulls the horizontal operation wire 79 in any one direction, the horizontal operation pulley 75 connected with the horizontal operation wire 79 is rotated, and then, a straight-directional tensile force of the horizontal operation wire is converted into a rotary power of the horizontal operation pulley by the rotation of the horizontal operation pulley 75, and power of the horizontal operation wheel 77 connected with the horizontal operation pulley 75 is converted into operating power by the gondola unit sub-frame 60 arranged in parallel with the subsidiary operation frame 71.

[0052] Hereinafter, referring to the drawings, an operation process of the cage apparatus for construction according to the preferred embodiment of the present invention will be described. FIGS. 3 and 4 illustrate back-and-forth movement and lateral movement of the cage apparatus.

[0053] First, FIGS. 3(A) and 3(B) show the back-and-forth movement. When two workers, who are standing on the foothold below the cage for construction, grasp the main operating part handle arranged at the upper part of the main operating part wheel bracket and apply power to one of the forward direction and the backward direction relative to the outer face of the building, the main operating part wheel 51 moves along the main frame rails 41 of the gondola unit main frame 40 while carrying out relative operation along the gondola unit main frame 40 of the cage gondola unit between the cages for construction, and the subsidiary operation frame 71 of the gondola unit sub-operating part 70 on which the gondola 80 is arranged, such that the gondola 80 is also moved.

[0054] Moreover, FIGS. 4(A) and 4(B) show the lateral movement. When the worker pulls the horizontal operation wire 79 wound on the horizontal operation pulley 75 arranged on the subsidiary operation frame 71 in the corresponding direction in order to rotate the horizontal operation pulley 75, the horizontal operation wheel 77 connected with the horizontal operation pulley 75 is rotated to carry out horizontal movement. That is, the horizontal operation wire 79 is wound on the horizontal operation pulley 75 and provides rotary power to the horizontal operation pulley 75 according to a tension direction to rotate the horizontal operation wheel 77. That is, when the worker pulls the horizontal operation wire 79 in any one direction, the horizontal operation pulley 75 connected with the horizontal operation wire 79 is rotated, and then, a straight-directional

tensile force of the horizontal operation wire is converted into a rotary power of the horizontal operation pulley by the rotation of the horizontal operation pulley **75**, and power of the horizontal operation wheel **77** connected with the horizontal operation pulley **75** is converted into operating power by the gondola unit sub-frame **60** arranged in parallel with the subsidiary operation frame **71**.

[0055] In this embodiment, as a simple structure for describing the present invention, just one gondola **80** arranged on the cage for construction is described, but various changes and modifications may be possible, for instance, a plurality of gondolas **80** may be arranged.

[0056] Additionally, a single gondola **80**, a plurality of gondola unit main frames and a plurality of gondola unit sub-frames are arranged, and the subsidiary operation frame and the gondola may be conveyed through movement of the gondola unit main frames and the gondola unit sub-frames. Namely, as shown in FIG. **5**, the cage apparatus for construction may adopt a structure that the gondola and the subsidiary operation frame may be conveyed from the present area of the gondola unit main frame and the gondola unit sub-frame, on which the present gondola and the present subsidiary operation frame are respectively located, to another gondola unit main frame and another gondola unit sub-frame existing in a neighboring area.

What is claimed is:

1. A cage apparatus for construction, which includes a cage base having a base frame supporting a base foothold to carry out frame work of a building, comprising:

a cage gondola unit arranged to be operated relative to the cage base to carry out exterior finish work of the building.

2. The cage apparatus according to claim **1**, wherein the cage gondola unit comprises:

a gondola unit main frame fixed and mounted on the cage frame;

a gondola unit main operating part, whose at least a part is arranged on the gondola unit main frame (**50**) to carry out relative operation; and

a gondola connected to the gondola unit main operating part to allow a worker to get on the gondola to carry out exterior finish work of the building.

3. The cage apparatus according to claim **2**, wherein a plurality of the base main frames and the gondola unit main frames are disposed.

4. The cage apparatus according to claim **3**, wherein main frame rails are disposed on the gondola unit main frame in a longitudinal direction, and

wherein the gondola unit main operating part (**50**) comprises:

a main operating part wheels which are operable along the main frame rails;

a main operating part wheel bracket connected with the main operating part wheels; and

a main operating part bracket handle which enables the worker to grip it to transfer power and is connected to the main operating part wheel bracket.

5. The cage apparatus according to claim **4**, wherein the cage gondola unit further comprises:

a gondola unit subsection part which operates the gondola in the direction perpendicular to the gondola unit main frame between the gondola unit main operating part and the gondola.

6. The cage apparatus according to claim **5**, wherein the gondola unit subsection part comprises:

a gondola unit sub-frame which is connected with the main operating part wheel bracket and has a longitudinal direction perpendicular to the gondola unit main frame;

a gondola unit sub-operating part which operates the gondola along the gondola unit sub-frame in the longitudinal direction of the gondola unit sub-frame.

7. The cage apparatus according to claim **6**, wherein the gondola unit sub-operating part comprises:

a subsidiary operation frame arranged to be parallel with the gondola unit sub-frame; and

a subsidiary operation wheel operable in a longitudinal direction of the subsidiary operation frame, and wherein the gondola is connected with the subsidiary operation frame through a gondola wire.

8. The cage apparatus according to claim **7**, wherein a plurality of the subsidiary operation wheels are disposed.

9. The cage apparatus according to claim **8**, wherein the gondola unit sub-operating part further comprises a vertical operation part which operates the gondola in a vertical direction.

10. The cage apparatus according to claim **9**, wherein the gondola wire has an end connected to the gondola and the other end wound on the vertical operation part, and the vertical operation part is a motor for winding the gondola wire.

11. The cage apparatus according to claim **10**, wherein the gondola sub-operating part comprises:

a horizontal operation pulley arranged on the subsidiary operation frame to be rotatable;

a horizontal operation wheel operated in a longitudinal direction of the gondola unit sub-frame and connected with the horizontal operation pulley; and

a horizontal operation wire which is wound on the horizontal operation pulley and provides rotary power to the horizontal operation pulley according to a tension direction to rotate the horizontal operation wheel.

* * * * *