



(12) **EUROPEAN PATENT APPLICATION**

(43) Date of publication:
10.10.2007 Bulletin 2007/41

(51) Int Cl.:
B66C 23/28 (2006.01)

(21) Application number: **07105272.4**

(22) Date of filing: **29.03.2007**

(84) Designated Contracting States:
AT BE BG CH CY CZ DE DK EE ES FI FR GB GR HU IE IS IT LI LT LU LV MC MT NL PL PT RO SE SI SK TR
Designated Extension States:
AL BA HR MK YU

(71) Applicant: **TGM S.R.L.**
22076 Mozzate CO (IT)

(72) Inventor: **Tornello, Giuseppe**
22076, Mozzate (CO) (IT)

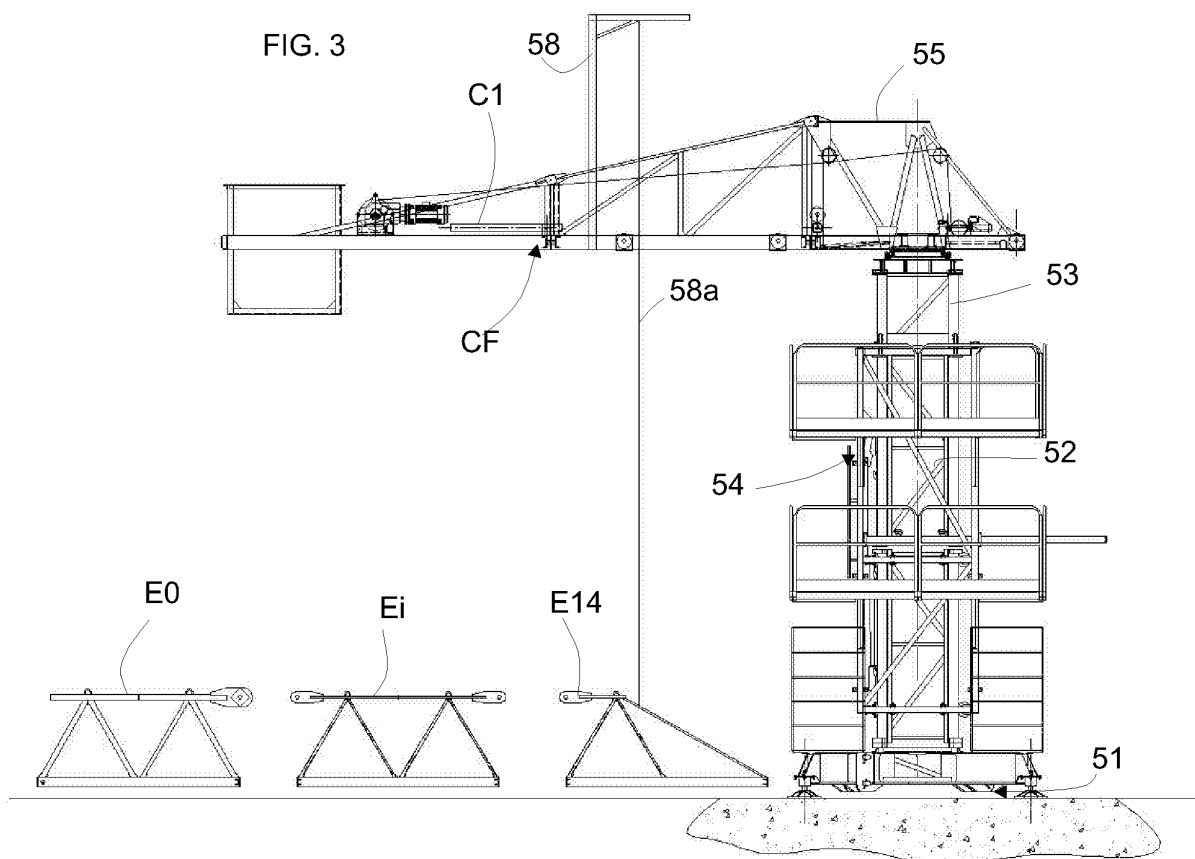
(74) Representative: **Guareschi, Antonella**
c/o Ing. Dallaglio S.r.l.
Viale Mentana 92/C
43100 Parma (IT)

(30) Priority: **05.04.2006 IT PR20060033**

(54) **Crane and method of assembling it**

(57) A crane (50) and a method of assembling it, which crane is of the type that comprises a tower (T), at whose top a slewing member supports a counter-jib (CF) and a jib (F) for lifting and handling loads.

A hoist means (58) loads and positions the different elements (E0, ... E14) of the jib (F) on corresponding sliding means of the counterjib (CF) for successive assembly of the jib (F).



Description

[0001] The present invention relates to a crane and a method of assembling it; such crane is of the type that is used for moving goods from a means of transport to a fixed installation, particularly at construction sites, to build and/or repair houses.

[0002] Traditional cranes are usually assembled by rotating their booms once the latter have been vertically mounted alongside the crane tower.

[0003] The tower is erected by having it supported by an assist truck-mounted crane which supports the upper section, while operators mount the lower portions.

[0004] Drawbacks of this prior art are experienced in old towns or where narrow spaces would make it difficult or even impossible to use traditional cranes, as rotating booms might hit adjacent buildings and there might be not enough space for a truck-mounted crane, thereby requiring the road traffic to be stopped.

[0005] The object of this invention is to provide a crane that could obviate the above drawbacks, as defined in the annexed claims.

[0006] These objects and advantages are achieved by the crane and method of assembling it according to this invention, which is characterized as set out in the annexed claims.

[0007] These and other features will be more apparent from the following description of a few embodiments, which are shown by way of example and without limitation in the accompanying drawings, in which:

- Figure 1 shows the disassembled components of a crane of this invention in a pre-assembly step,
- Figure 2 shows the counter-jib assembly steps,
- Figure 3 shows the step of mounting the jib elements using a hoist means,
- Figure 4 shows the step of loading the jib elements,
- Figure 5 shows the introduction of the trolley, the jib point and the hoisting tackle,
- Figure 6 shows the step of placing the tower element on the trolleys prior to climbing,
- Figure 7 shows the step of opening the climbing frame with the tower element attached to the hoisting tackle,
- Figure 8 shows the step of fully opening the climbing frame with the tower element being released and the trolley/hoisting tackle being moved apart,
- Figure 9 shows the introduction of the tower element by a climbing operation,
- Figure 10 shows the assembly of the frame panels,
- Figure 11 shows the whole climbing frame assembly with the pawls and the hoist unit,
- Figure 12 shows the step of mounting the frame to the tower element,
- Figure 13 shows a variant embodiment having a counter-jib lifting system,
- Figure 14 shows the crane with the counter-jib lifted.

[0008] Referring to Figures 1, 2, 13 and 14, numeral 50 generally designates a crane of the type that comprises a tower T, at whose top a slewing member supports a counter-jib CF and a jib F for lifting and handling loads.

[0009] Such crane 50 has a hoist means 58 on the counter-jib part, in this example an auxiliary cantilevered hoist, which loads and positions the different elements E0, ... E14 of the jib F on corresponding sliding means, for successive assembly of the jib F.

[0010] The counterjib CF is comprised of a slewing member 55, a central element 56 and a winch and counterweight-holding end element.

[0011] The central element 56 and the slewing member 55 are adapted to hold, i.e. contain, an element E0, ... E14 of the jib F, and have the above mentioned sliding means.

[0012] Referring to Figures 3 and 4, it can be appreciated that the hoist means 58 is preferably attached to the element 56 so that the expected jib element may be attached thereto by means of a rope 58a.

[0013] A block pushing fork is contained in the counterjib CF and slides the element loaded by the hoist means 58 and held in the element 56 or in the central member 55.

[0014] The thrust action is conveniently provided by a hydraulic or pneumatic cylinder C1.

[0015] The elements E1, ... E14 of the jib F are successively loaded, one at a time, starting from the outermost lightest element.

[0016] The element loaded by the hoist means 58 is attached to the block pushing fork.

[0017] Furthermore, the crane 50, namely the tower T, has a climbing frame 54 for raising the counterjib CF /slewing member 55 unit to allow introduction of further successive tower elements 52 and increasing the height of the crane 50.

[0018] Particularly, such climbing frame 54 comprises a hoist unit 10 which pushes the lower tower element 52 thereby lifting the upper element, its thrust action being given by a hydraulic cylinder 11.

[0019] The climbing frame 54 operates on and is fixed to a pushing member 53 located under the slewing member 55 and has an opening through which the tower element 52 to be added is introduced.

[0020] Such additional tower element 52 is lifted by the hoisting tackle 66 of the crane 50.

[0021] The elements E0, ... E14 of the jib are fastened together by pins and bolts.

[0022] While a crane 50 with 14 elements of the jib F is mentioned in the above example, such specification is not intended to limit the inventive scope.

[0023] Referring to Figures 13 and 14, it will be appreciated that the counter-jib CF can rotate relative to the central member 55 thanks to the action of a hydraulic or pneumatic cylinder C2.

[0024] Such cylinder C2 is attached to a beam 72 and its stem is attached to another beam 71, the former on the slewing member 55, the latter on the central element

56, so that, by operating the cylinder C2, the counter-jib CF rotates, due to its being pivotally mounted to the slewing member 55, and rises.

[0025] This arrangement is advantageous when the crane has to be rotated and an obstacle prevents rotation thereof.

[0026] The action of the hoist means 58 is also conveniently used for laying each jib element back on the ground once operation of the crane 50 is terminated.

[0027] In practice, the method of assembling the crane 50 includes a step of on-ground pre-assembling a tower section and counter-jib elements, such as a winch and counterweight-holding end element, a central element for loading the jib elements, including the slewing member and a pushing element; a step of assembling the jib, by loading and successively sliding the various jib elements that are loaded into the counter-jib CF by an auxiliary cantilevered host 58 located on the central element of the counter-jib CF; a step of fully assembling the tower by raising the counter-jib and/or the jib by means of a climbing frame; it being understood that the tower assembly step may precede the jib assembly step.

[0028] The jib elements are loaded and attached from the lightest to the heaviest, i.e. from the outermost element, in this case the element E14 (tip element) to the centermost element, in this case the element E0.

[0029] Also, as mentioned above, each jib element is loaded and laid on corresponding sliding rollers and attached to a block pushing fork, which is driven by a hydraulic or pneumatic piston.

[0030] Preferably, at least two elements 52 of the tower T are fastened together during on-ground pre-assembly.

[0031] Obviously, the on-ground pre-assembly step starts with installation of the base 51 and relevant ballast.

[0032] Referring to Figure 5, it will be noted that, once assembly of the jib F is completed, the trolley 64 is mounted thereto and the jib point 65 is fitted thereon, trolley drive and hoisting ropes are fed and the hoisting tackle is inserted 66, for introducing further elements 52 of the tower T, as described above.

[0033] The next steps are installation of a jib trolley limit stop with its support and power cord, application of trolley pulling ropes, and application of capacity signs and the safety rope.

[0034] Referring to Figures 10, 11 and 12 the climbing frame 54 is shown, and the following components are designated by numerals:

- 1 left panel
- 2 right panel
- 3 rear panel
- 4 lower front panel
- 5 connecting beam
- 6 right trolley guide
- 7 right trolley
- 8 left trolley guide
- 9 left trolley
- 10 hoist unit

- 11 hydraulic cylinder
- 12 pawl
- 13 guide rollers
- 14 opposing rollers.

[0035] Once the above panels have been assembled (as shown in the figures), the frame 54 has to be hung by the pawls 12 and the unit 10 on the corresponding tower element 52.

[0036] Such frame 54 also has upper 54b and lower platforms 54a.

[0037] While reference has been specifically made therein to a hoist means 58 such as an auxiliary cantilevered hoist, such specification can also be extended to equivalent hoist means.

[0038] The hoist means 58 is located on a counter-jib CF element 56 or on the slewing member 55 in a cantilever relationship.

[0039] Preferably, the on-ground pre-assembly step can be also carried out on vehicles.

Claims

1. A crane (50), of the type that comprises a tower (T), at whose top a slewing member supports a counter-jib (CF) and a jib (F) for lifting and handling loads, **characterized in that** it comprises a hoist means (58) which loads and positions the different elements (E0, ... E14) of the jib (F) on corresponding sliding means, for successive assembly of said jib (F).
2. A crane as claimed in claim 1, **characterized in that** it comprises a block pushing fork for sliding the element loaded by the hoist means (58), the thrust action being provided by a hydraulic or pneumatic cylinder (C1).
3. A crane as claimed in claim 1, **characterized in that** each jib element is loaded into the central element (56) or the central slewing member (55) of the counter-jib.
4. A crane as claimed in claim 1, **characterized in that** the elements (E1, ... E14) are successively loaded, one at a time, starting from the outermost lightest element.
5. A crane as claimed in claim 1, **characterized in that** the tower (T) has a climbing frame (54) which is adapted to allow insertion of successive tower elements (52) by raising the counter-jib (CF) / slewing member (55) unit.
6. A crane as claimed in claim 5, **characterized in that** said climbing frame (54) comprises a hoist unit (10) which pushes the lower tower element (52) thereby lifting the upper element, said thrust action being giv-

en by a hydraulic cylinder (11).

7. A crane as claimed in claim 5, **characterized in that** the climbing frame (54) operates on and is fixed to a pushing member (53) located under the slewing member (55). 5
8. A crane as claimed in claim 5, **characterized in that** the climbing frame (54) has an opening through which the tower element to be added is introduced. 10
9. A crane as claimed in claim 5, **characterized in that** the additional tower element (52) is lifted by the hoisting tackle (66) of the crane (50). 15
10. A crane as claimed in claim 1, **characterized in that** the elements (E0, ... E14) of the jib (F) are fastened together by pins and bolts. 20
11. A crane as claimed in claim 1, **characterized in that** the counter-jib (CF) can rotate relative to the central member (55) thanks to the action of a hydraulic or pneumatic cylinder (C2). 25
12. A crane as claimed in claim 1, **characterized in that** the hoist means (58) is located on an element (56) of the counter-jib (CF) or on the slewing member (55) in a cantilever relationship. 30
13. A crane as claimed in claim 1, **characterized in that** the hoist means (58) is also used for laying each element (E0, ... E14) of the jib (F) back on the ground during dismantling of the crane (50). 35
14. A crane as claimed in claim 1, **characterized in that** it comprises a hydraulic or pneumatic cylinder (C2) which is attached to a beam (72), its stem being attached to another beam (71), the former on the slewing member (55), the latter on the central element (56), so that, by operating the cylinder (C2), the counter-jib (CF) rotates, due to its being pivotally mounted to the slewing member (55), and rises. 40
15. A crane assembly method, **characterized in that** it comprises the following steps: 45
 - a. A step of pre-assembling a section of the tower (T) and elements (55, 56, 57) of the counter-jib (CF), such as a winch and counterweight-holding end element (57), a central element (56) for loading the jib elements, a slewing member (55); 50
 - b. a step of assembling the jib, by loading and successively sliding the various elements of the jib (F) that are loaded onto an element of the counter-jib (CF) by an hoist means (58); said step of assembling the jib (F) being carried out by successively sliding and assembling the el-

ements (E0, ...E14) so loaded;
c. a step of fully assembling the tower (T), by raising the counter-jib (CF) and/or the jib (F) by means of a climbing frame (54).

16. An assembly method as claimed in claim 15, **characterized in that** the step of assembling the tower (T) may precede the step of assembling the jib (F). 55
17. An assembly method as claimed in claim 15, **characterized in that** the jib elements are loaded and attached from the lightest (E14) to the heaviest (E0), i.e. from the outermost or tip element to the centermost element. 60
18. An assembly method as claimed in claim 15, **characterized in that** each jib element (E0, ...E14) is loaded and positioned on corresponding sliding rollers and attached to a block pushing fork. 65
19. An assembly method as claimed in claim 15, **characterized in that** the block pushing fork is driven by a hydraulic or pneumatic cylinder (C1). 70
20. An assembly method as claimed in claim 15, **characterized in that** the section of the tower (T) in the on-ground pre-assembly step is composed of at least two elements (52). 75
21. An assembly method as claimed in claim 15, **characterized in that** the on-ground pre-assembly step starts with installation of the base and relevant ballast (51). 80
22. An assembly method as claimed in claim 15, **characterized in that** the counter-jib is pivotally mounted to the slewing member (55) and can rise and rotate relative to such central member (55) thanks to the action of a hydraulic or pneumatic cylinder (C2) between said member (55) and the counter-jib (CF). 85
23. An assembly method as claimed in claim 15, **characterized in that** assembly of the jib (F) is followed by the steps of: 90
 - a. introducing the trolley (64),
 - b. fitting the jib point (65),
 - c. feeding the trolley drive ropes (64),
 - d. introducing the hoisting tackle (66),
 - e. installing the jib trolley limit stop with its support and power cord,
 - f. applying the trolley pulling ropes,
 - g. applying the capacity signs,
 - h. applying the safety rope. 95

FIG. 1

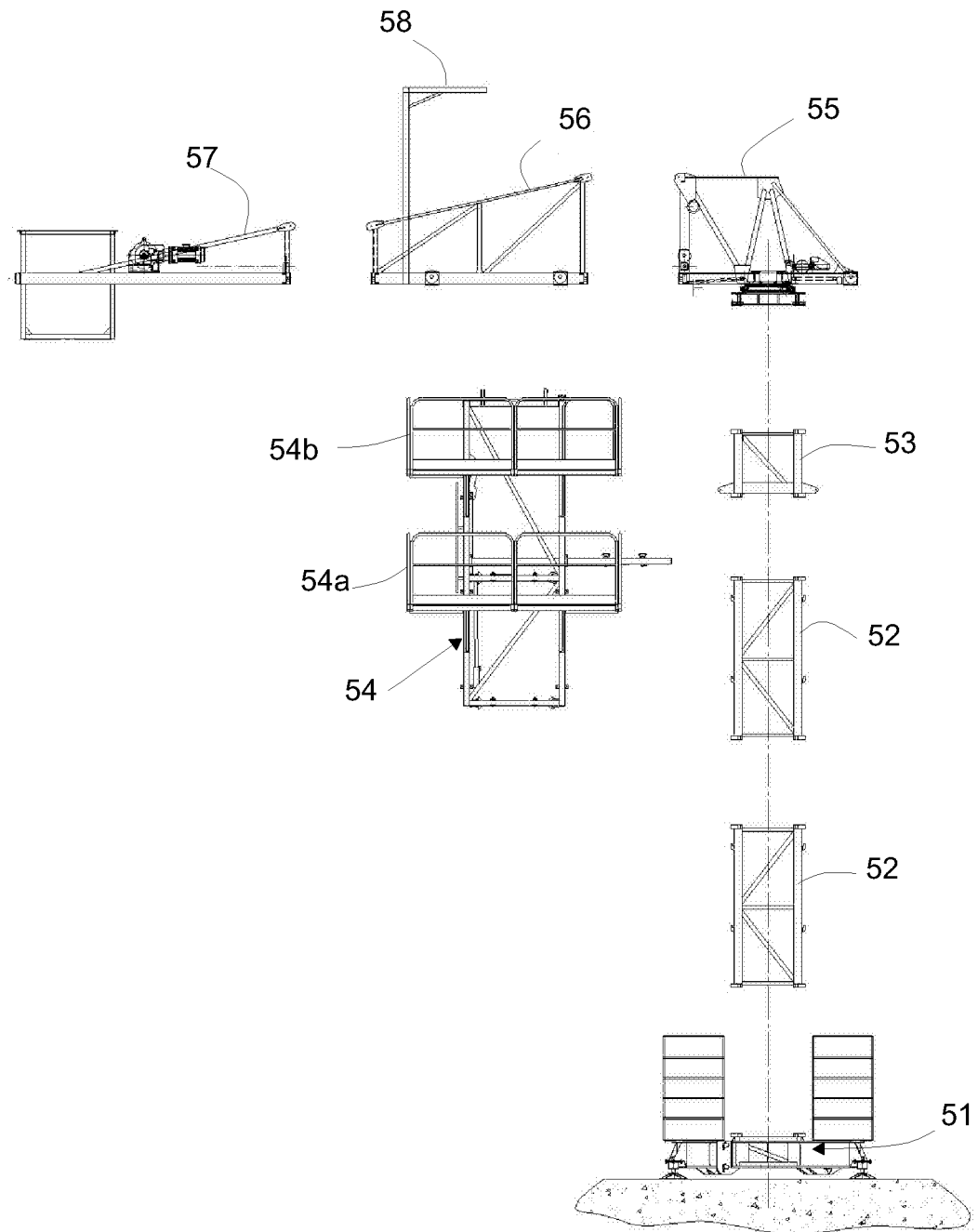
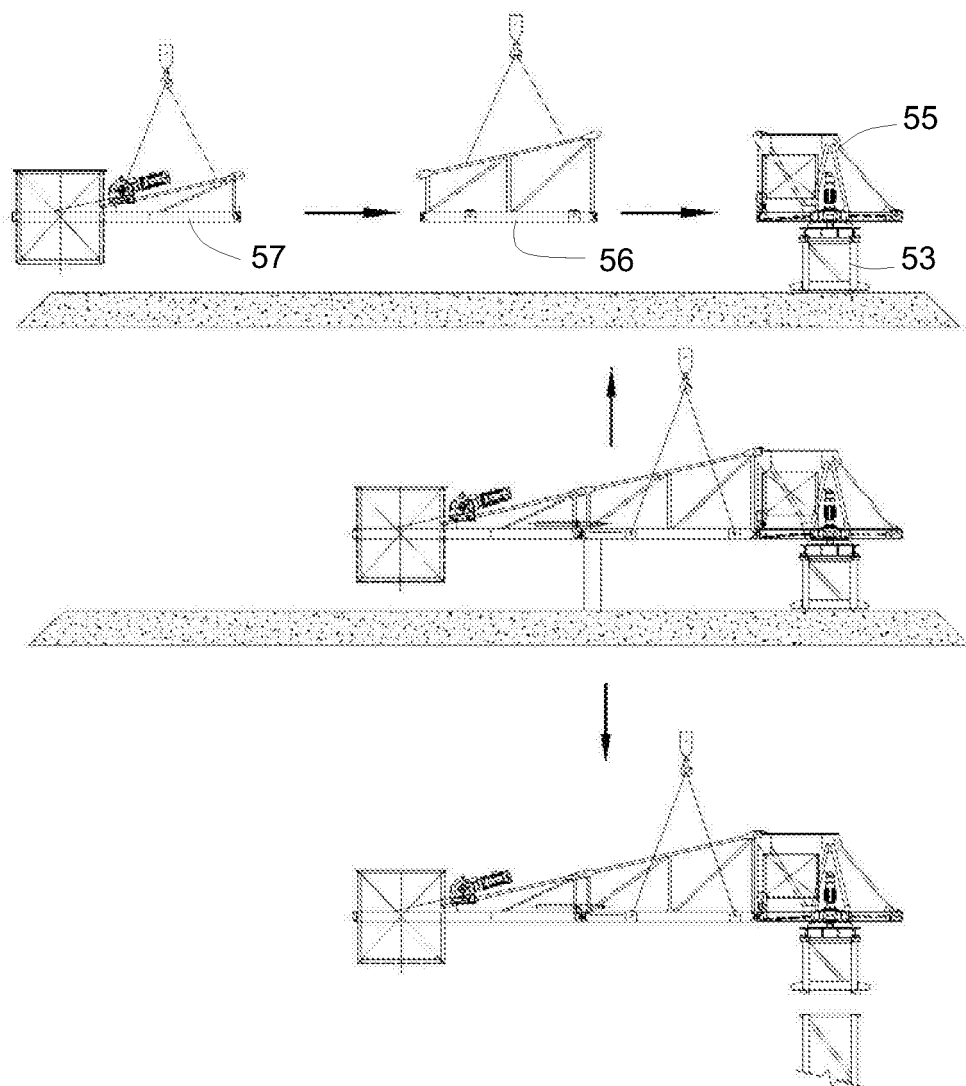


FIG. 2



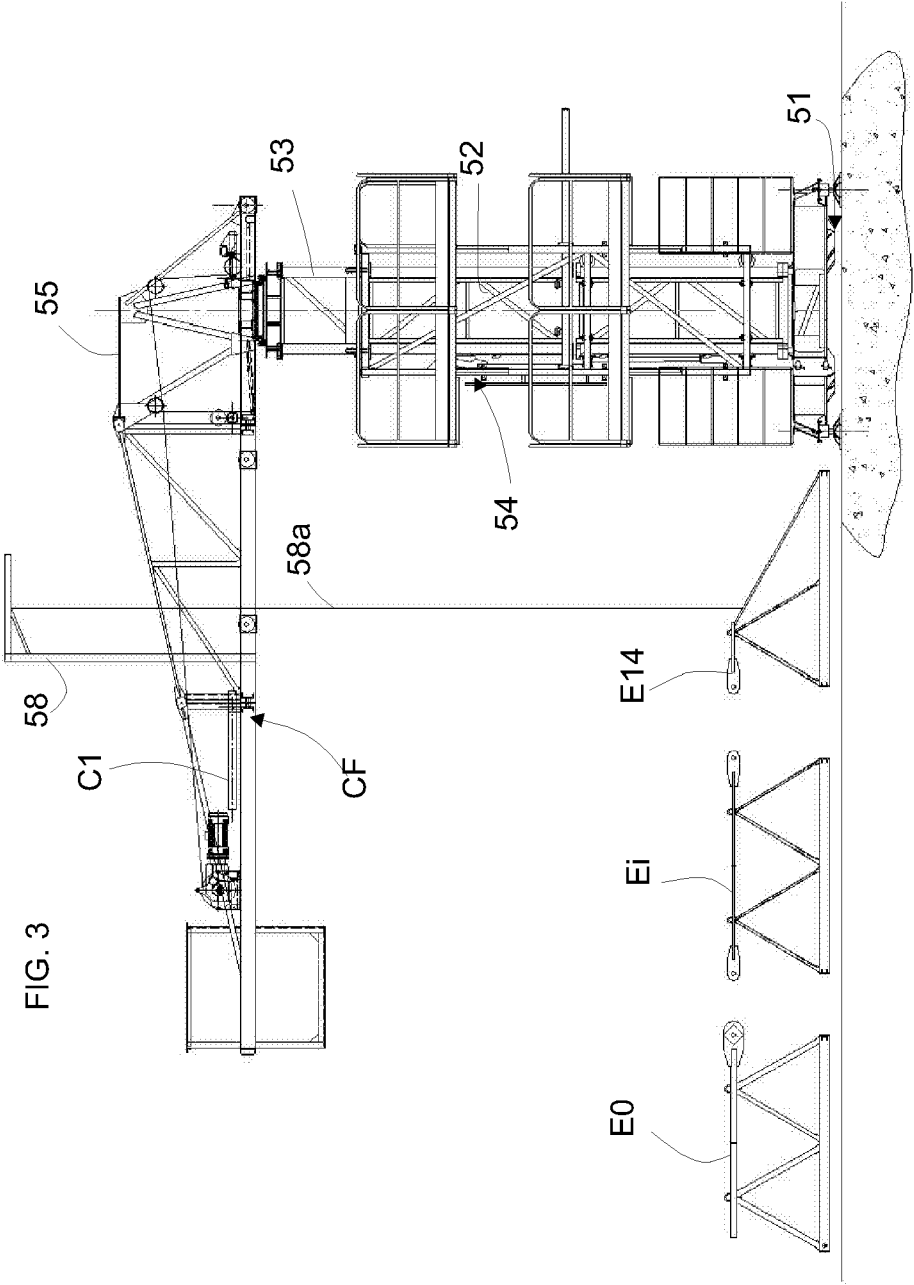


FIG. 4

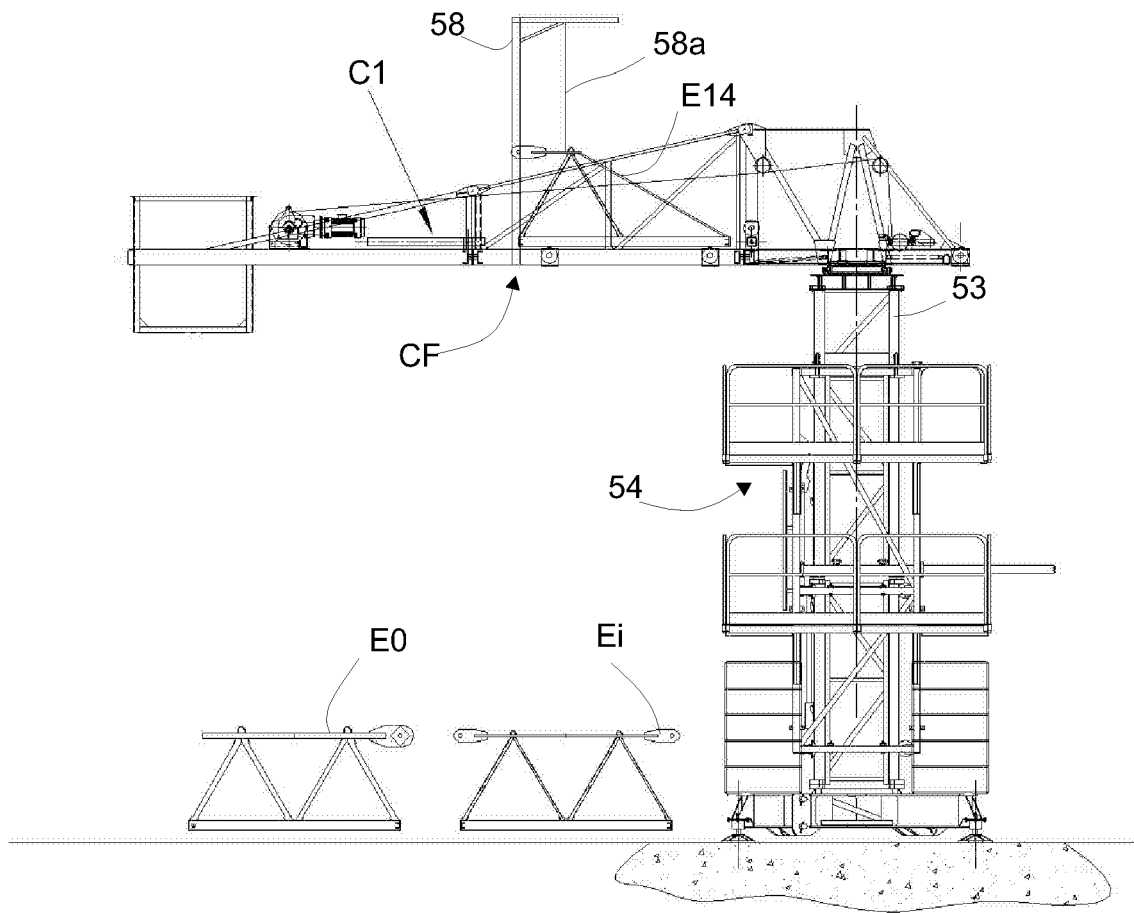


FIG. 5

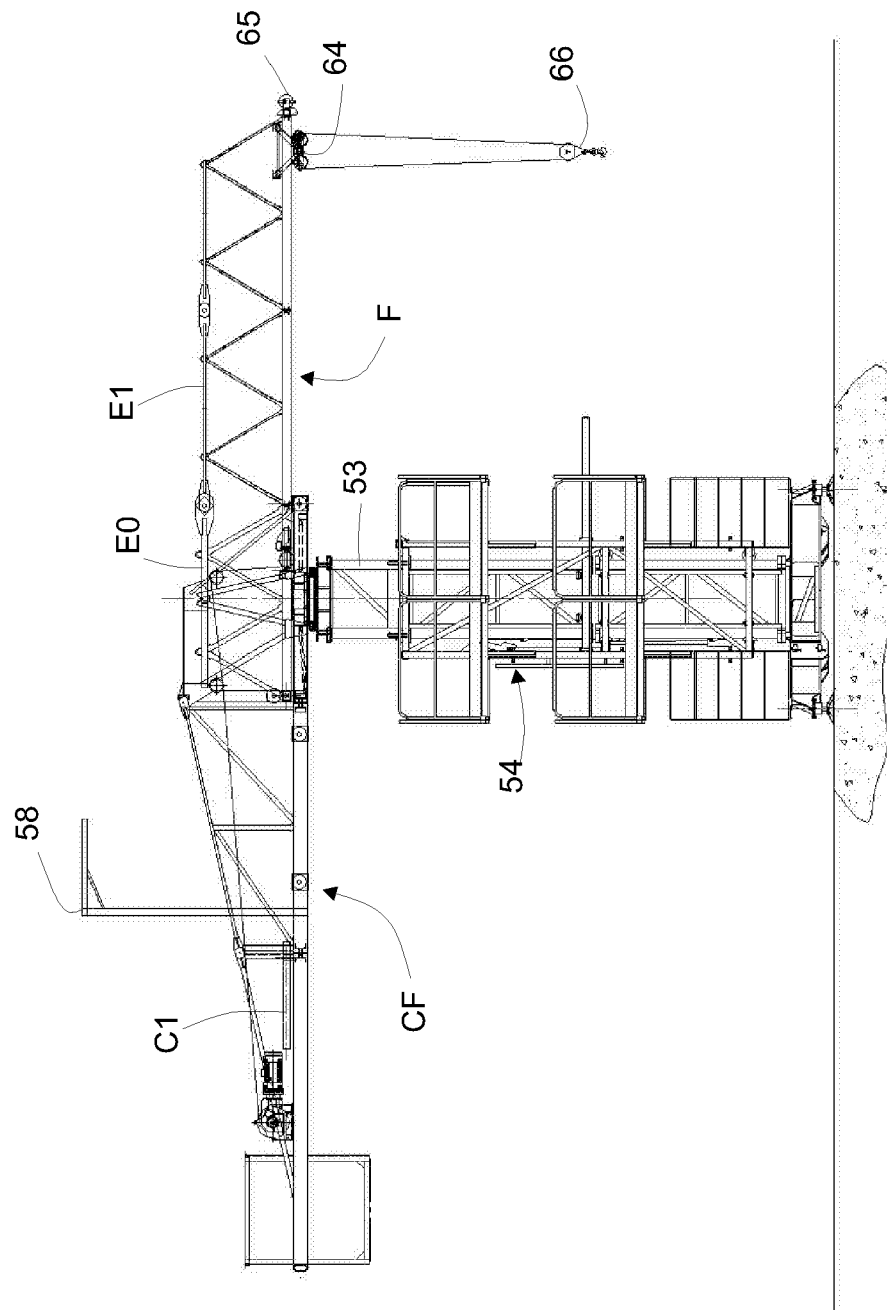


FIG. 6

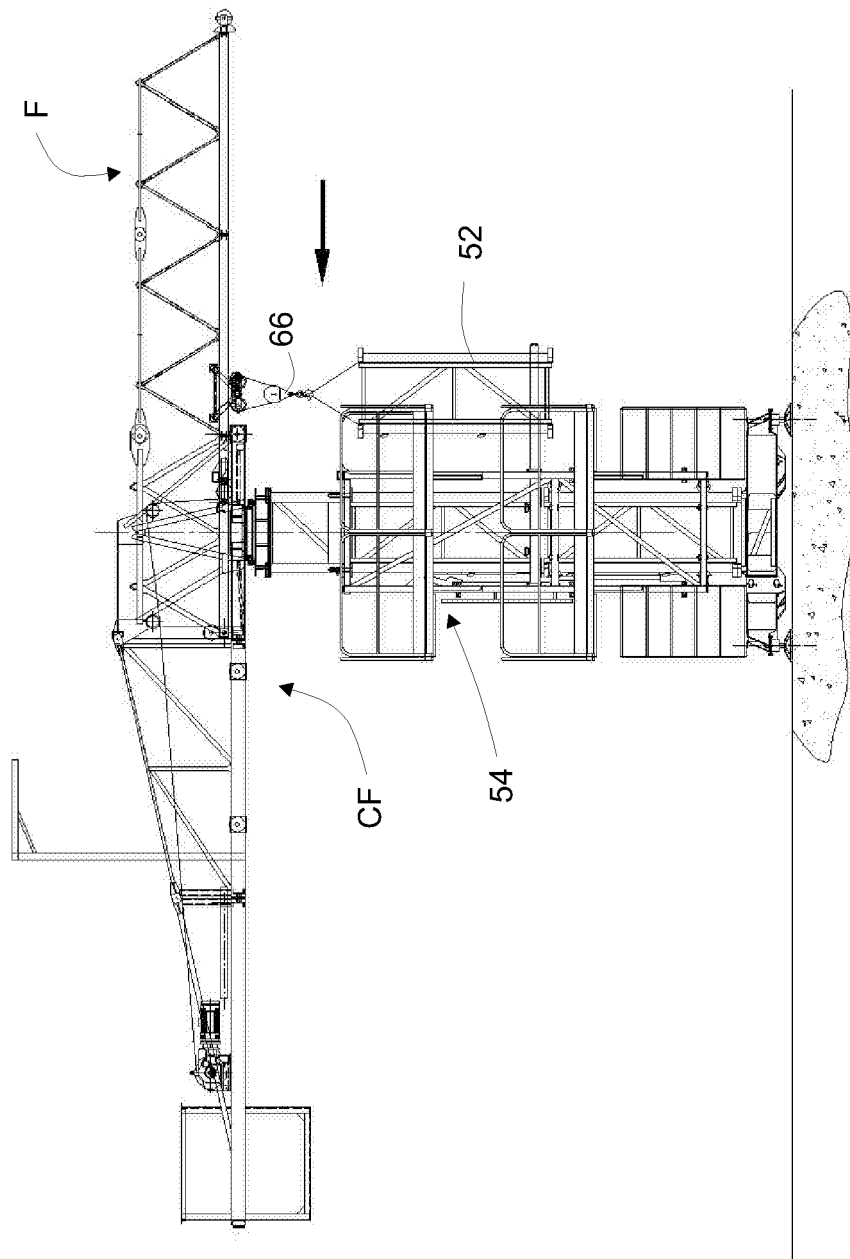


FIG. 7

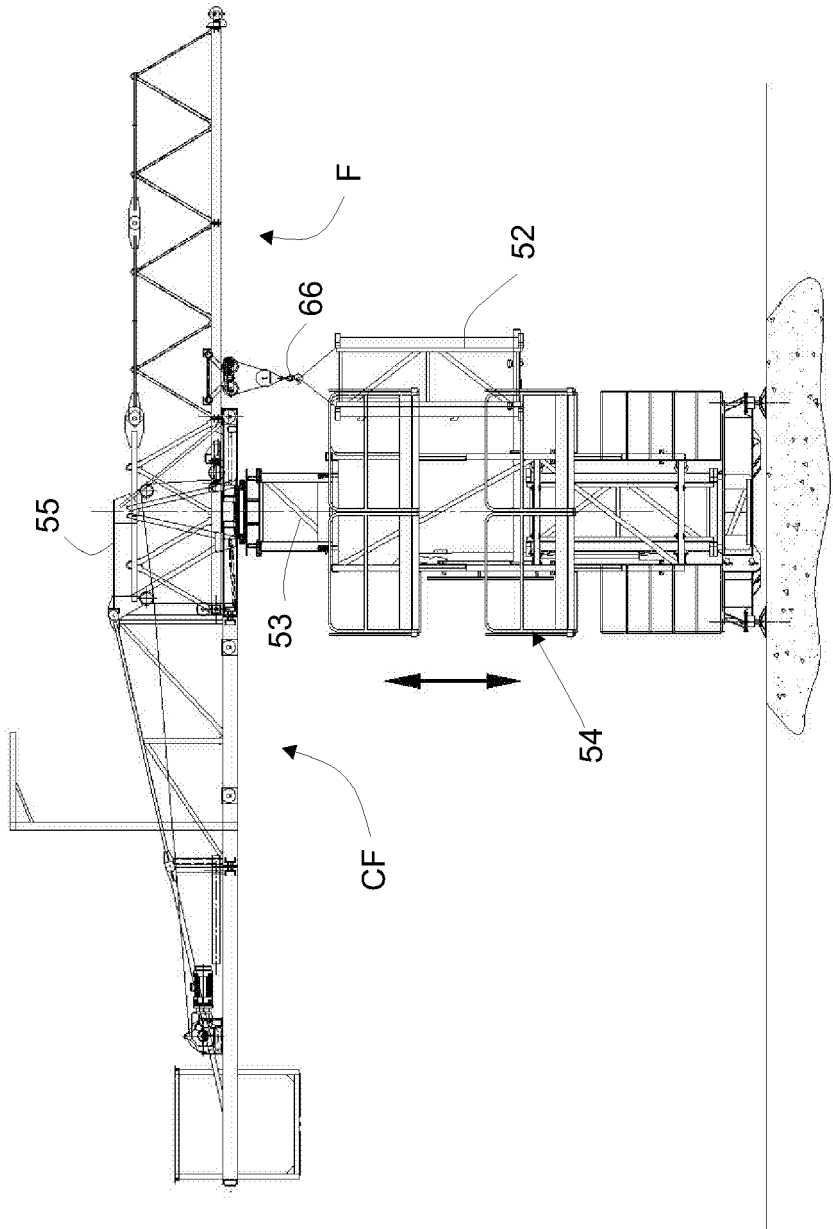
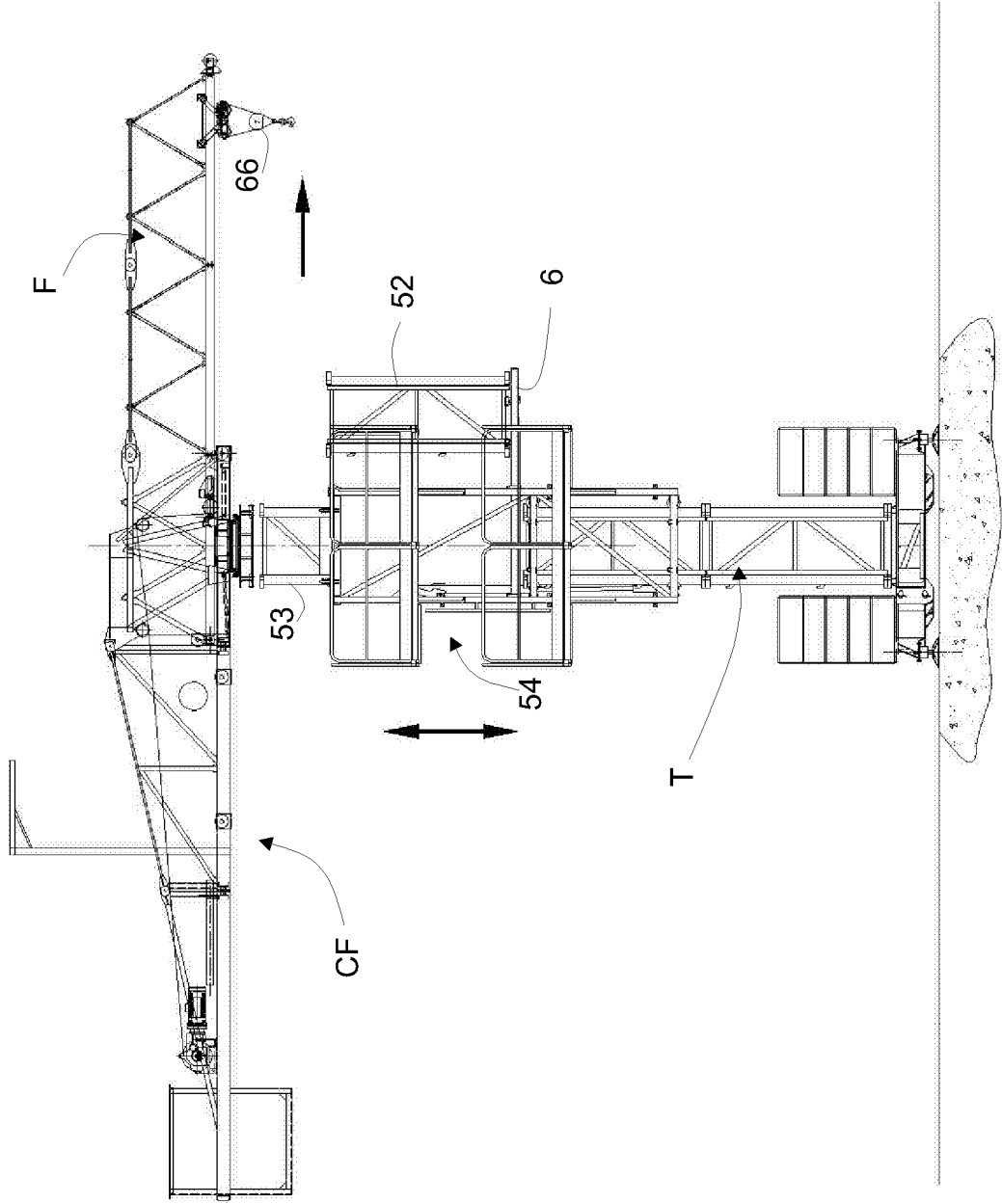


FIG. 8



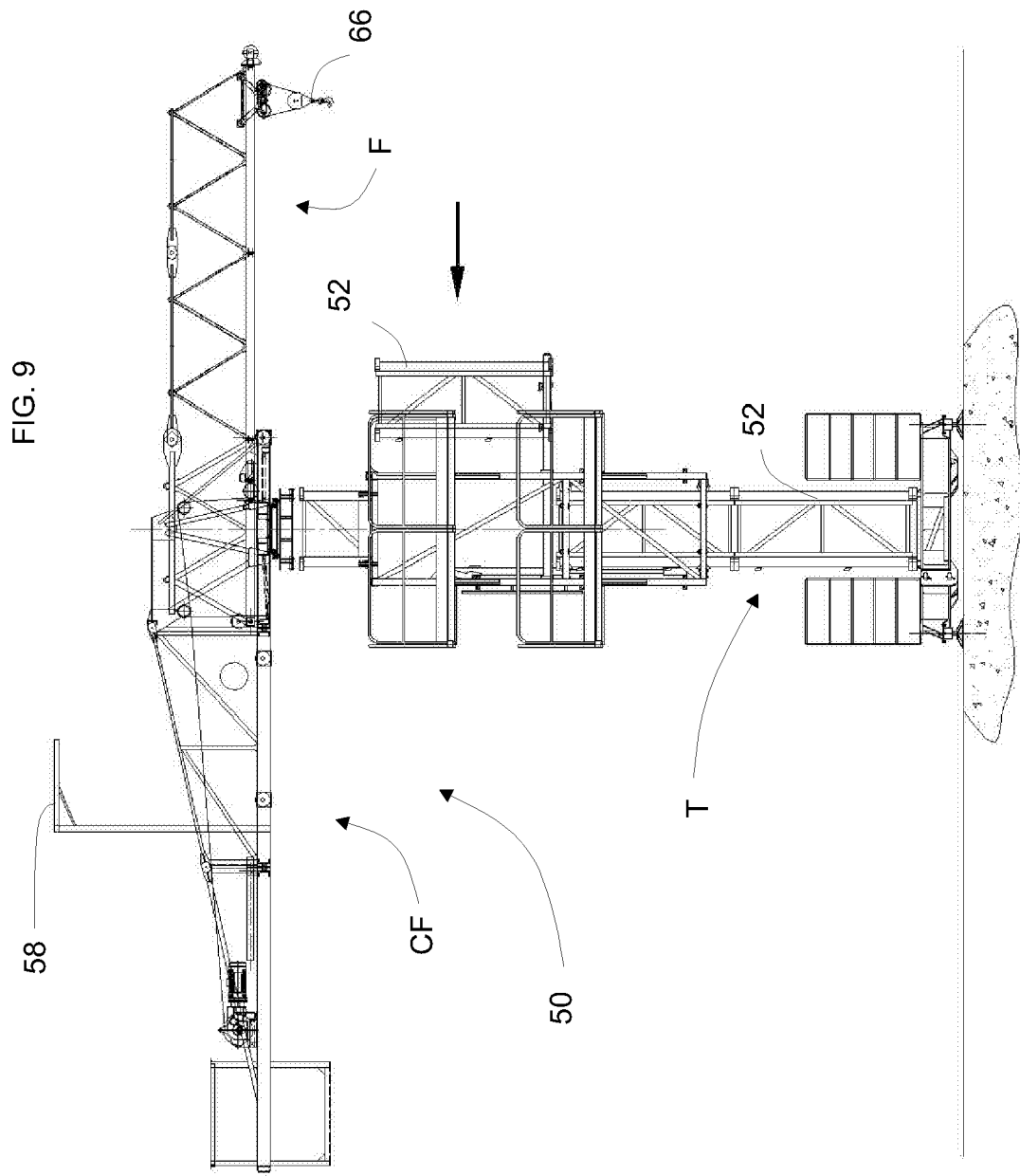


FIG. 10

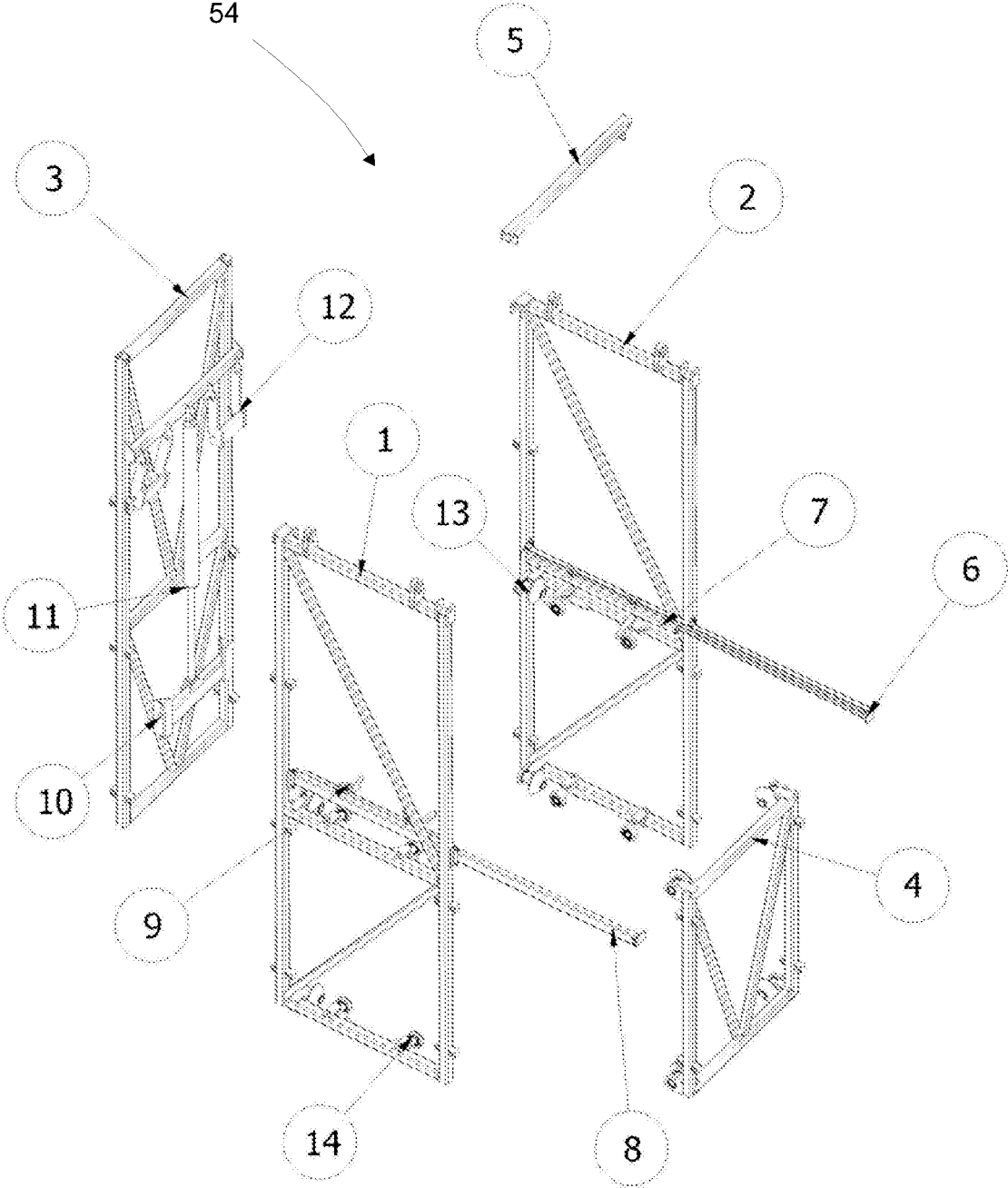


FIG. 11

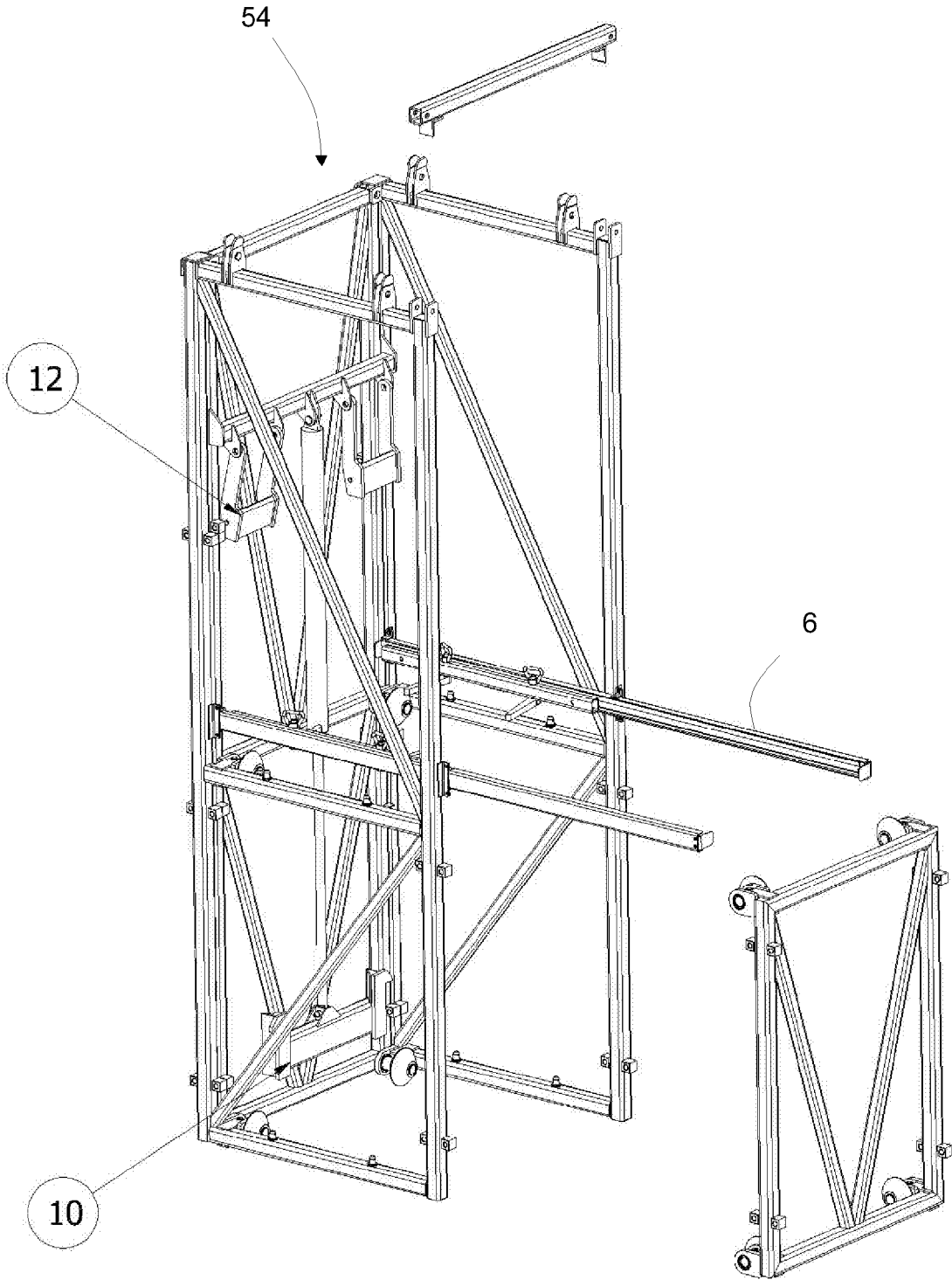


FIG. 12

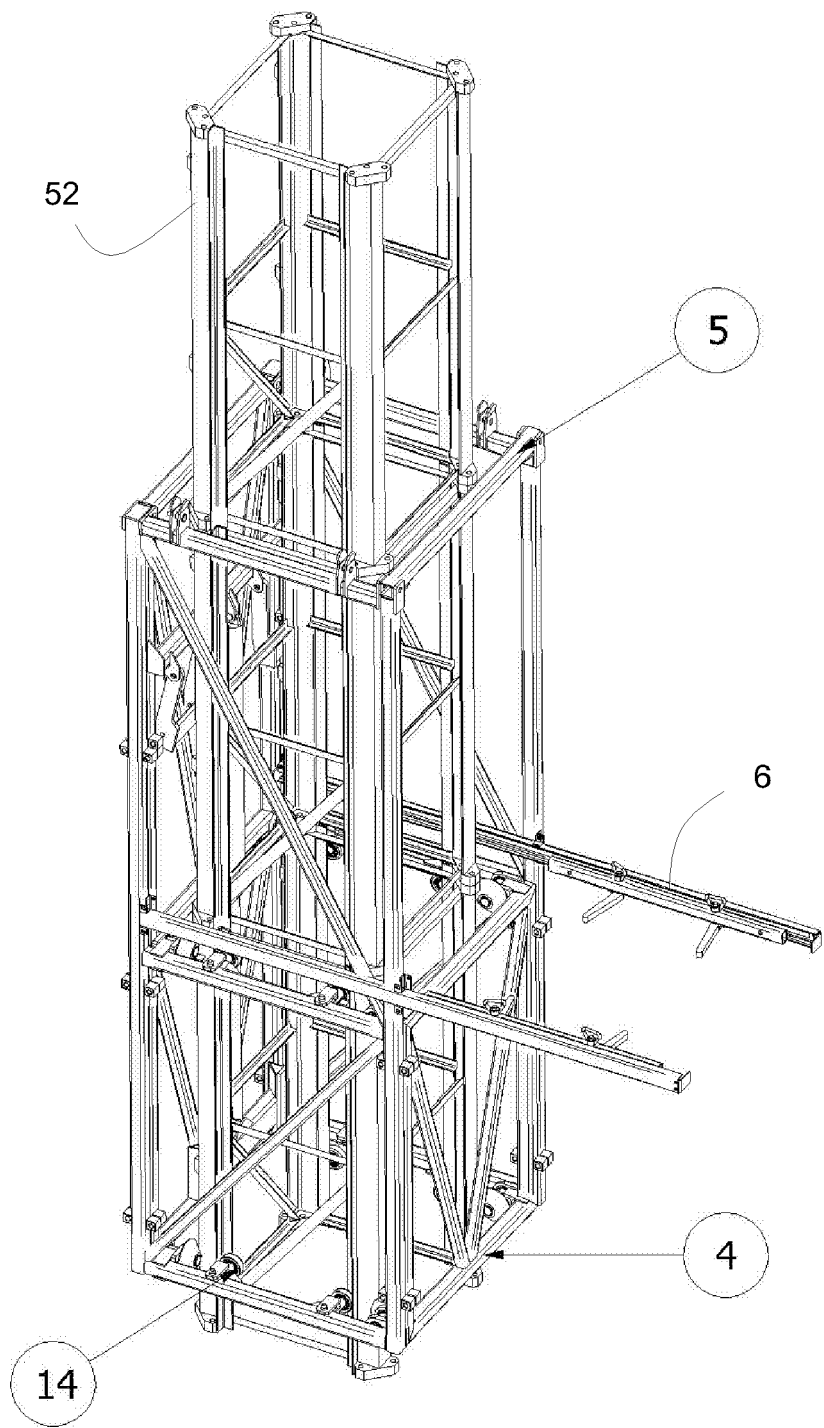


FIG. 13

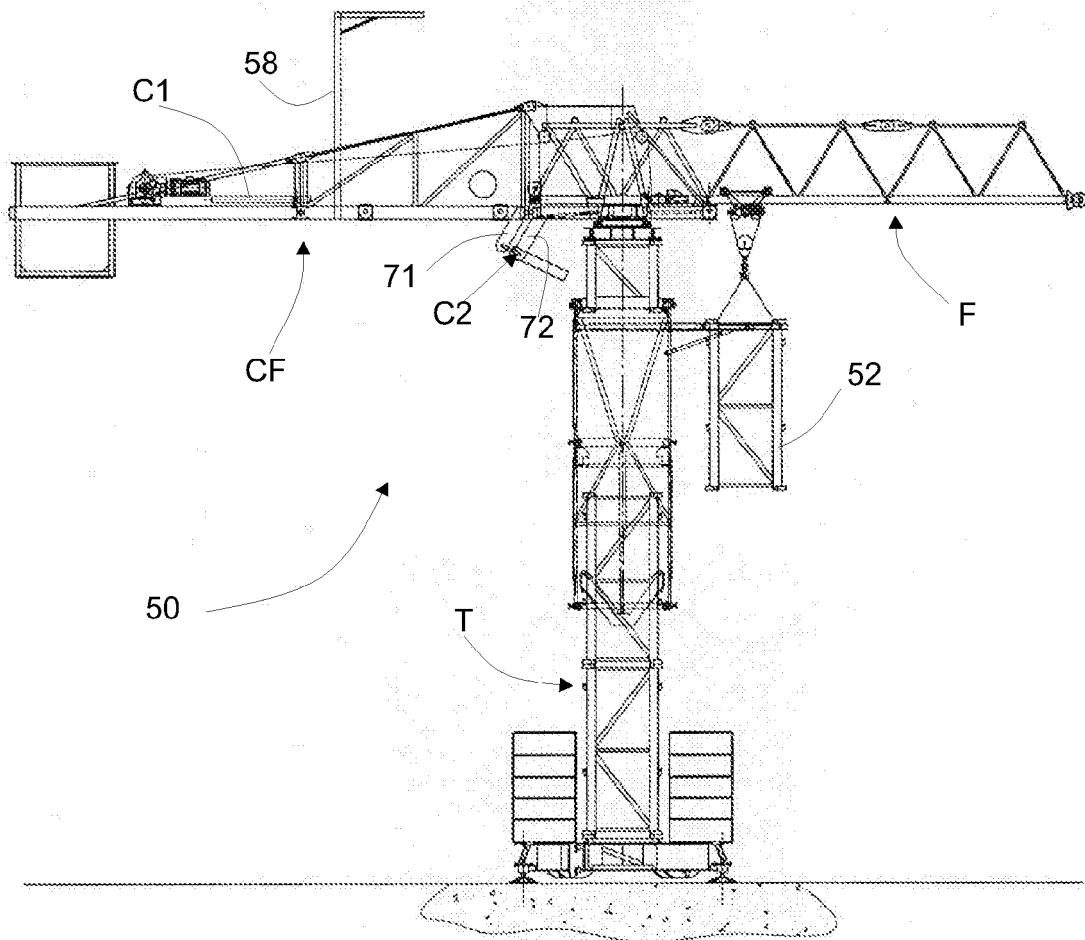


FIG. 14

