(19) Europäisches Patentamt
European Patent Office
Office européen des brevets

(11) **EP 1 806 312 A2**

(12) **EUROPEAN PATENT APPLICATION**

(43) Date of publication:
11.07.2007 Bulletin 2007/28

(51) Int Cl.:
B66F 9/12 *(2006.01)* ***B66F 9/08*** *(2006.01)*

(21) Application number: **07075002.1**

(22) Date of filing: **02.01.2007**

(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 NL PL PT RO SE SI SK TR
Designated Extension States:
AL BA HR MK YU

(30) Priority: **06.01.2006 NL 1030868**

(71) Applicant: **Quick Group B.V.**
4194 TW Meteren (NL)

(72) Inventor: **Kikstra, Willem Otto**
4194 TW Meteren (NL)

(74) Representative: **Grootscholten, Johannes A.M. et al**
Arnold & Siedsma
Sweelinckplein 1
2517 GK The Hague (NL)

(54) **Device and method for lifting loads**

(57) The present invention provides a device for lifting loads, comprising:
- a lifting frame (2) comprising two uprights (4,6) placed at a distance from each other;
- a mast (12) displaceable in longitudinal direction relative to the lifting frame (2);
- a lifting member provided with lifting means mounted on the mast (12) for the purpose of lifting the load and/or attaching auxiliary members; and
- at least two cylinders (14,16) placed at a distance from each other close to the uprights of the lifting frame (2) for the purpose of displacing the mast (12) relative to the lifting frame (2).

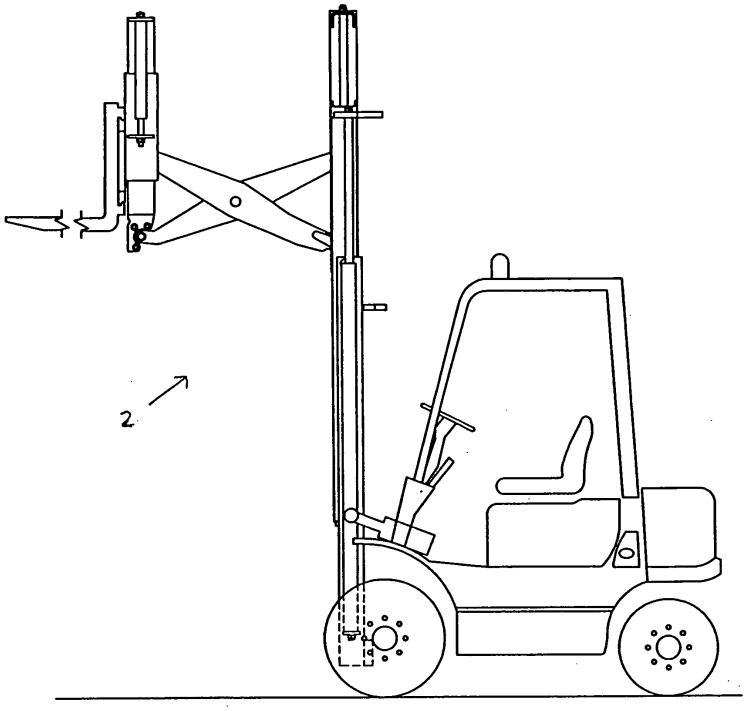

FIG. 1

EP 1 806 312 A2

Description

[0001] The invention relates to a device for lifting loads.

[0002] Devices applied for lifting loads, for instance forklift trucks, make use of a lifting frame mounted on such a forklift truck, wherein lifting means are provided on this lifting frame. These lifting means are usually in the form of prongs or forks. The lifting means are brought to the correct height by displacement relative to the lifting frame using cylinders and a chain transmission.

[0003] The transmission with chains which is used in practice requires additional components such as a pulley which, in view of the often heavy load, must have large dimensions. This large dimensioning also applies for the lifting frame in which the chains and pulleys are mounted. This results in a relatively expensive embodiment, requires additional maintenance and relatively large dimensions of the lifting frame with associated components in the normal direction of travel of such a forklift truck.

[0004] The present invention has for its object to improve the known device.

[0005] The present invention provides a device for lifting loads, comprising:

- a lifting frame comprising two uprights placed at a distance from each other;
- a mast displaceable in longitudinal direction relative to the lifting frame;
- a lifting member provided with lifting means mounted on the mast for the purpose of lifting the load and/or attaching auxiliary members; and
- at least two cylinders placed at a distance from each other close to the uprights of the lifting frame for the purpose of displacing the mast relative to the lifting frame.

[0006] By using cylinders which, for the same lifting height, take a longer form than in conventional devices, it is possible to dispense with the use of chains and pulleys for moving the lifting means in height direction. Due to this reduction in components maintenance is reduced and the device can be given a lighter construction. The placing of one or more cylinders on the outer side of the lifting frame or outer mast also achieves that a less heavy construction can be used for the device, since the varying forces caused by the load to be lifted do not have to be transmitted laterally to the outer side of the device from a cylinder placed in the centre as in conventional devices. A better view of the load by the user is also achieved through this placing of the cylinders on the outer side. The construction of the device according to the present invention also becomes smaller in the normal direction of travel. The lifting member with lifting means can be used to lift the load directly, although an auxiliary member or attachment, such as for instance a shear member, a reach fork or a tipping device can also be used here.

[0007] In a further preferred embodiment according to the present invention the cylinders are embodied as double-acting cylinders for controlled movement of the mast relative to the frame in two opposite directions. This achieves that the load can be displaced in controlled and restrained manner not only in upward direction but also in downward direction (so not displaced only as a result of the force of gravity).

[0008] In a further preferred embodiment according to the present invention one or more intermediate masts or inner masts are provided which are displaceable relative to the lifting frame by means of at least two cylinders placed at a distance from each other close to the uprights of the mast. A greater height over which a load can be lifted can be reached by means of an intermediate mast without the drive-through height of for instance a forklift truck being increased.

[0009] In a further preferred embodiment according to the present invention there is provided a control member for coupling the drive of different cylinders. In the case that on one side two cylinders act on the drive of the same mast, a double extending speed of the mast relative to the lifting frame can hereby be achieved. This increases the handling speed for displacing loads. In the case that the cylinders act on different masts a smoother extending movement of the masts relative to the lifting frame can be effected by means of the control member. This achieves that the load is lifted in less jolting manner.

[0010] In a further preferred embodiment according to the present invention there is provided a shear member which is mounted at one side on the mast and at the other side is fixed to the lifting member. A load displaced by means of lifting means can hereby also be displaced in the normal direction of movement of the device without displacing the device itself. Placing of the cylinders on the outer side of the mast and/or the lifting frame achieves that such a shear member in retracted position is situated almost wholly between the mast and/or the lifting frame, whereby the dimensioning of the whole device remains limited in the normal direction of travel. Due to this limited dimensioning such a device requires a smaller storage space. It is also possible to suffice with a simpler construction.

[0011] In a further preferred embodiment according to the present invention the relative movement of the mast and/or intermediate mast(s) is embodied with a roller guide or a sliding guide. The advantage of the lighter construction according to the invention is that with a sliding guide it is possible to operate up to higher loads of the device compared to known devices.

[0012] In a further preferred embodiment according to the present invention the lifting member is provided with a front mast and is displaceable relative to the front mast by means of one or more cylinders placed on the outer side of the front mast. This achieves that a load displaced with the lifting means can be lifted in simple manner over an obstacle. It is also possible to place such a device on for instance a caterpillar vehicle such that loads can hereby still be lifted from a ground surface.

[0013] The invention also relates to a device for lifting

loads, comprising:

- a lifting frame comprising an upright;
- a mast displaceable in longitudinal direction relative to the lifting frame;
- a lifting member provided with lifting means mounted on the mast for lifting the load and/or attaching auxiliary members; and
- at least one cylinder placed close to the upright of the lifting frame for the purpose of sliding the mast relative to the lifting frame.

[0014] This has the advantage that only one upright is used, which results in a simpler construction.

[0015] The invention also relates to a forklift truck provided with a device according to the present invention. Loads can hereby be lifted and displaced to a desired position in simple manner. The device according to the present invention can also be provided on already existing forklift trucks.

[0016] The invention also relates to a rear loader or transportable pallet truck for loading and unloading for instance trucks provided with a device according to the present invention. Such a transportable pallet truck is located at the rear of trucks and is transported between loading location and unloading location. The absence of chains and pulleys on the device according to the present invention is additionally advantageous in such a transportable pallet truck in respect of the load on such a device during transport and the degree of fouling which can occur during such transport.

[0017] The invention also relates to a method for lifting loads provided with a lifting frame with two uprights placed at a distance from each other, comprising the steps of:

- displacing a mast relative to the lifting frame by means of at least two cylinders placed at a distance from each other close to the uprights of the lifting frame; and
- lifting a load by means of lifting means mounted on a lifting member.

[0018] The invention will now be elucidated on the basis of a number of embodiments, wherein reference is made to the accompanying drawings, in which:

figure 1 shows a forklift truck with a device according to the invention;
figure 2 shows a perspective view of a device according to the invention;
figure 3 is a side view of an embodiment according to the present invention; and
figure 4 shows an alternative embodiment of the device of figure 3.

[0019] The forklift truck as shown in figure 1 is provided with a device according to the invention which will be described in more detail hereinbelow.

[0020] The device as shown in figure 2 has a lifting frame 2, comprising two uprights 4,6 and one or more transverse connections 8. Intermediate mast 12 can be displaced in height direction relative to lifting frame 2 by means of guides 10 and uprights 4,6. Intermediate mast 12 is displaced relative to lifting frame 2 by means of two cylinders 14,16 placed on the outer side of lifting frame 2 close to uprights 4,6. Cylinders 14,16 are connected on one side to uprights 4,6 of lifting frame 2 and on the other side to connecting part 18 of intermediate mast 12 which connects uprights 20 and 22 on the top side of intermediate mast 12. Placed on the underside of intermediate mast 12 is a connecting part 24, on the outer side of which two cylinders 26,28 are placed close to uprights 4,6 and uprights 20,22, which cylinders are connected on the other outer end to the top side of mast 34 by means of supports 30,32. Mast 34 is provided with two uprights 36,38 and an upper connecting part 40 and a lower connecting part 42. Mast 34 is further provided with an upper intermediate rod 44 and a lower intermediate rod 46 on which a shear mechanism 48 is mounted. The other outer end of shear 48 is attached to a front mast 50 comprising two uprights 52,54, an upper connecting part 56 and a lower connecting rod 58. Front mast 50 is further provided with two cylinders 60,62 with which lifting board or fork carrier 64 can be displaced in the height in a manner not shown relative to front mast 50. Cylinders 60,62 hereby move sliding masts 53,55 over uprights 52,54. Lifting board 64 is provided with two forks 66,68 with which the load can be lifted.

[0021] Figure 3 shows shear 48 placed between mast 34 and front mast 50. In the shown situation front mast 50 is situated at a distance from mast 34. By causing pivot arms 47,49 to rotate in opposite directions about their pivot point 51, wherein the upper outer ends of arms 47,49 move in the guides arranged in the respective uprights 36,38 and 52,54, the front mast 50 with the fork carrier is retracted to mast 34. Shear arms 47,49 are situated substantially between uprights 36,38 once the fork carrier has been retracted. Cylinder 60 on the front mast slides the fork carrier downward. In the retracted position this fork carrier is situated in the upper position.

[0022] In figure 4 cylinder 60 is mounted the other way round so that in a rest position the fork carrier is situated in the lower position.

[0023] The present invention is by no means limited to the above described preferred embodiments; the rights sought, within the scope of which many modifications can be envisaged, are defined by the following claims.

Claims

1. Device for lifting loads, comprising:

- a lifting frame comprising two uprights placed at a distance from each other;

- a mast displaceable in longitudinal direction relative to the lifting frame;
- a lifting member provided with lifting means mounted on the mast for the purpose of lifting the load and/or attaching auxiliary members; and
- at least two cylinders placed at a distance from each other close to the uprights of the lifting frame for the purpose of displacing the mast relative to the lifting frame.

2. Device as claimed in claim 1, wherein one or more cylinders are embodied as double-acting cylinders for controlled movement of the mast relative to the frame in two opposite directions.

3. Device as claimed in claim 1 or 2, wherein one or more intermediate masts are provided which are displaceable relative to the lifting frame by means of at least two cylinders placed at a distance from each other close to the uprights of the mast.

4. Device as claimed in claim 1, 2 or 3, wherein a control member is provided for coupling the drive of cylinders associated with one mast.

5. Device as claimed in one or more of the foregoing claims 1-4, wherein a control member is provided for coupling the drive of cylinders associated with different masts.

6. Device as claimed in one or more of the foregoing claims 1-5, wherein a shear member is provided which is mounted at one side on the mast and at the other side is fixed to the lifting member, and which in retracted position can be placed for the greater part between the uprights of the mast and/or the lifting frame.

7. Device as claimed in one or more of the foregoing claims 1-6, comprising a roller guide or sliding guide for the relative movement of the mast and/or intermediate mast.

8. Device as claimed in one or more of the foregoing claims 1-7, wherein the lifting member is provided with a front mast and is displaceable in the height relative to the front mast by means of one or more cylinders placed on the outer side of the front mast.

9. Device for lifting loads, comprising:

- a lifting frame comprising an upright;
- a mast displaceable in longitudinal direction relative to the lifting frame;
- a lifting member provided with lifting means mounted on the mast for lifting the load and/or attaching auxiliary members; and
- at least one cylinder placed close to the upright of the lifting frame for the purpose of displacing the mast relative to the lifting frame.

10. Forklift truck provided with a device as claimed in any of the foregoing claims 1-9.

11. Transportable pallet truck for loading and unloading for instance trucks, provided with a device as claimed in any of the foregoing claims 1-9.

12. Method for lifting loads provided with a lifting frame with two uprights placed at a distance from each other, comprising the steps of:

- displacing a mast relative to the lifting frame by means of at least two cylinders placed at a distance from each other close to the uprights of the lifting frame; and
- lifting a load by means of lifting means mounted on a lifting member.

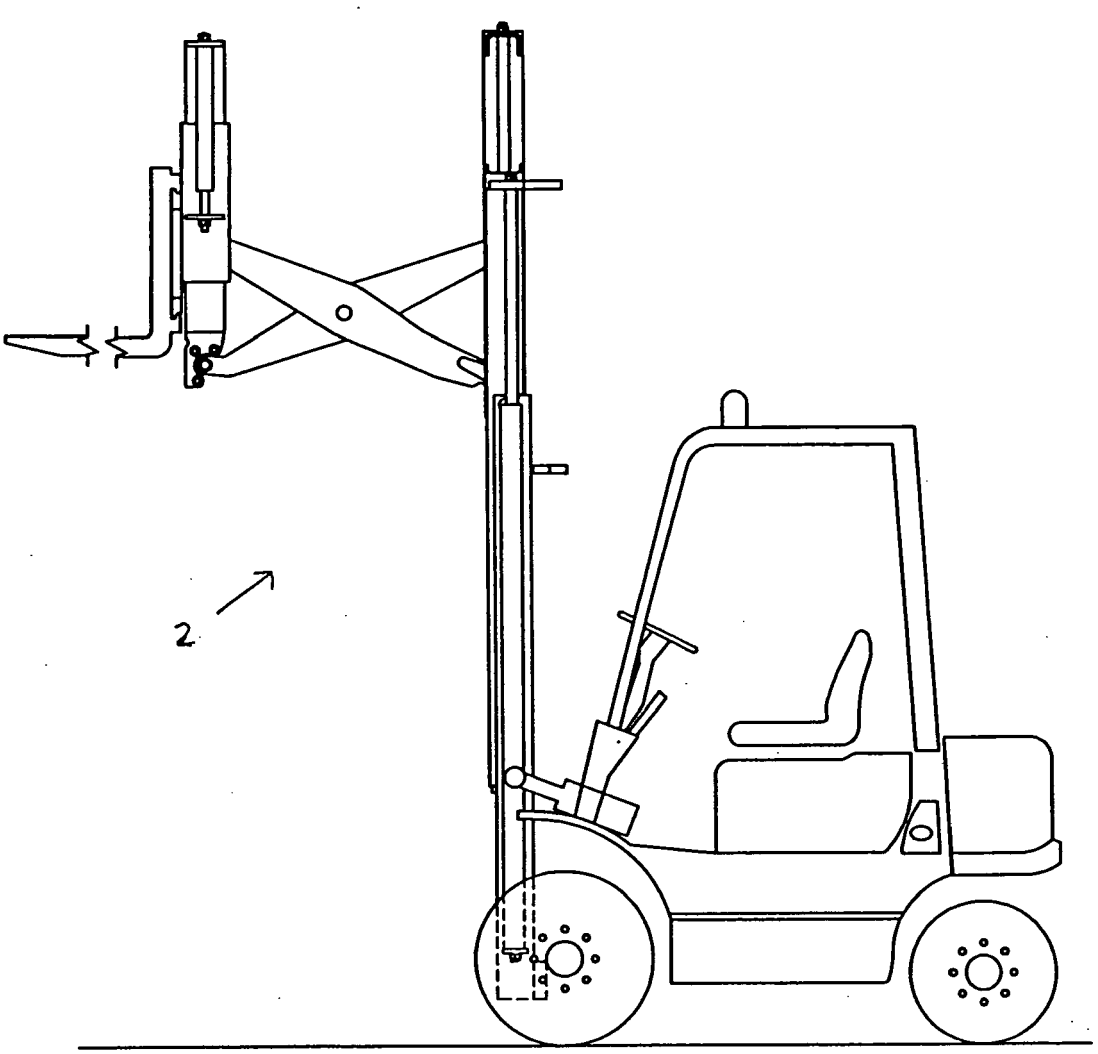

FIG. 1

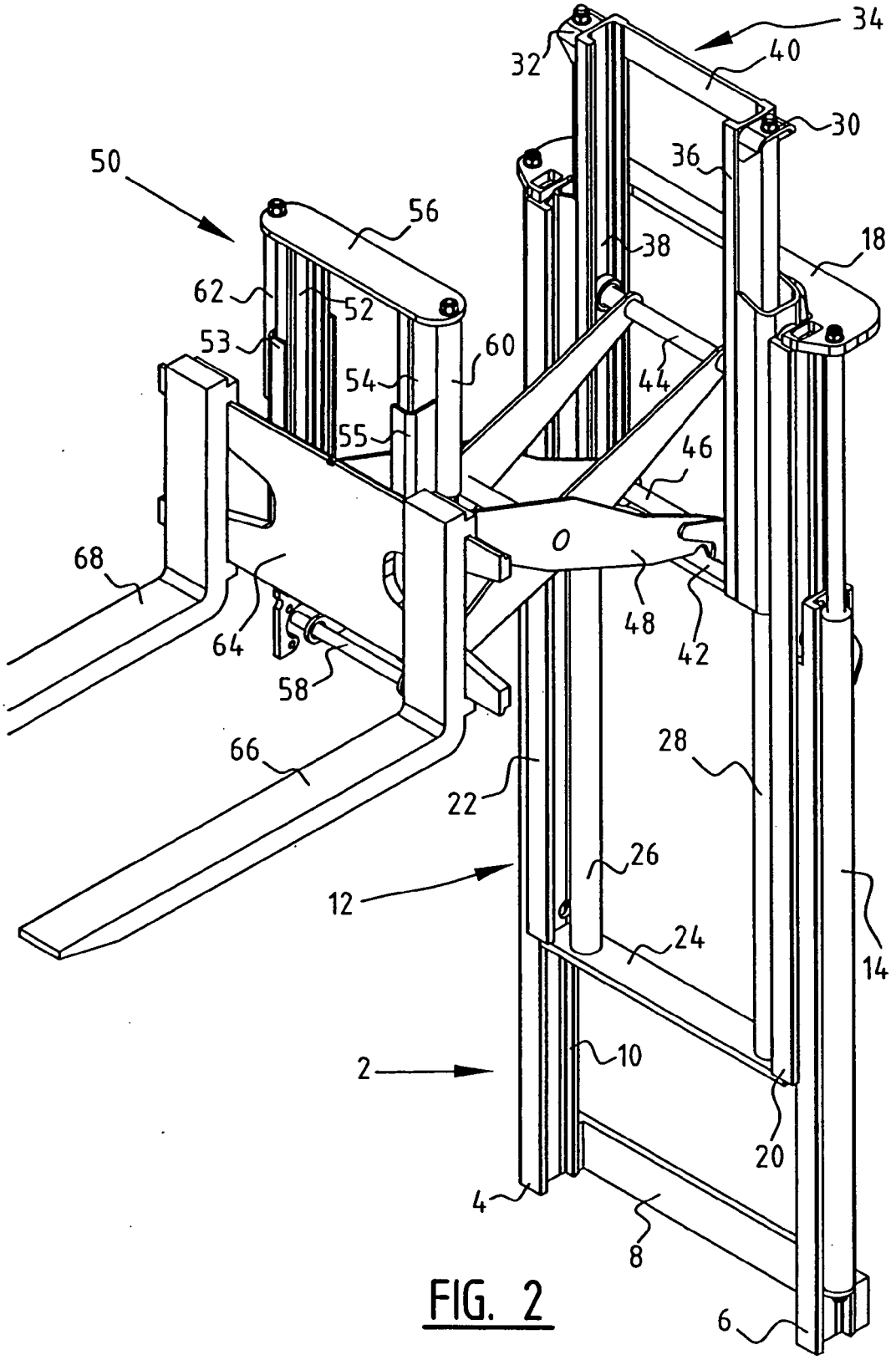
34
32
40
30
36
50
56
38
18
62
52
53
60
54
44
55
46
68
48
42
64
58
66
28
22
26
12
24
14
10
2
20
4
8
6

FIG. 2

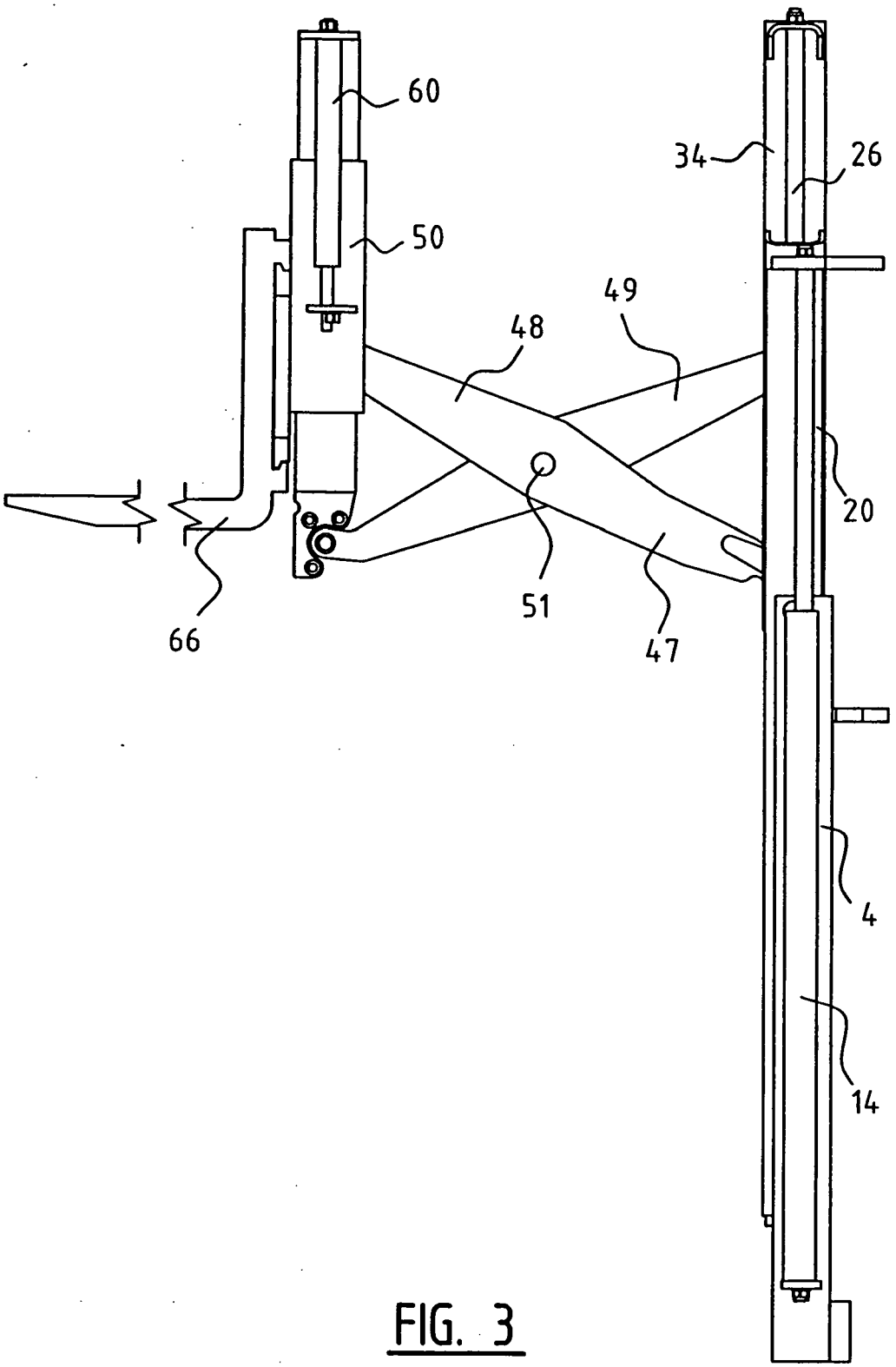

FIG. 3

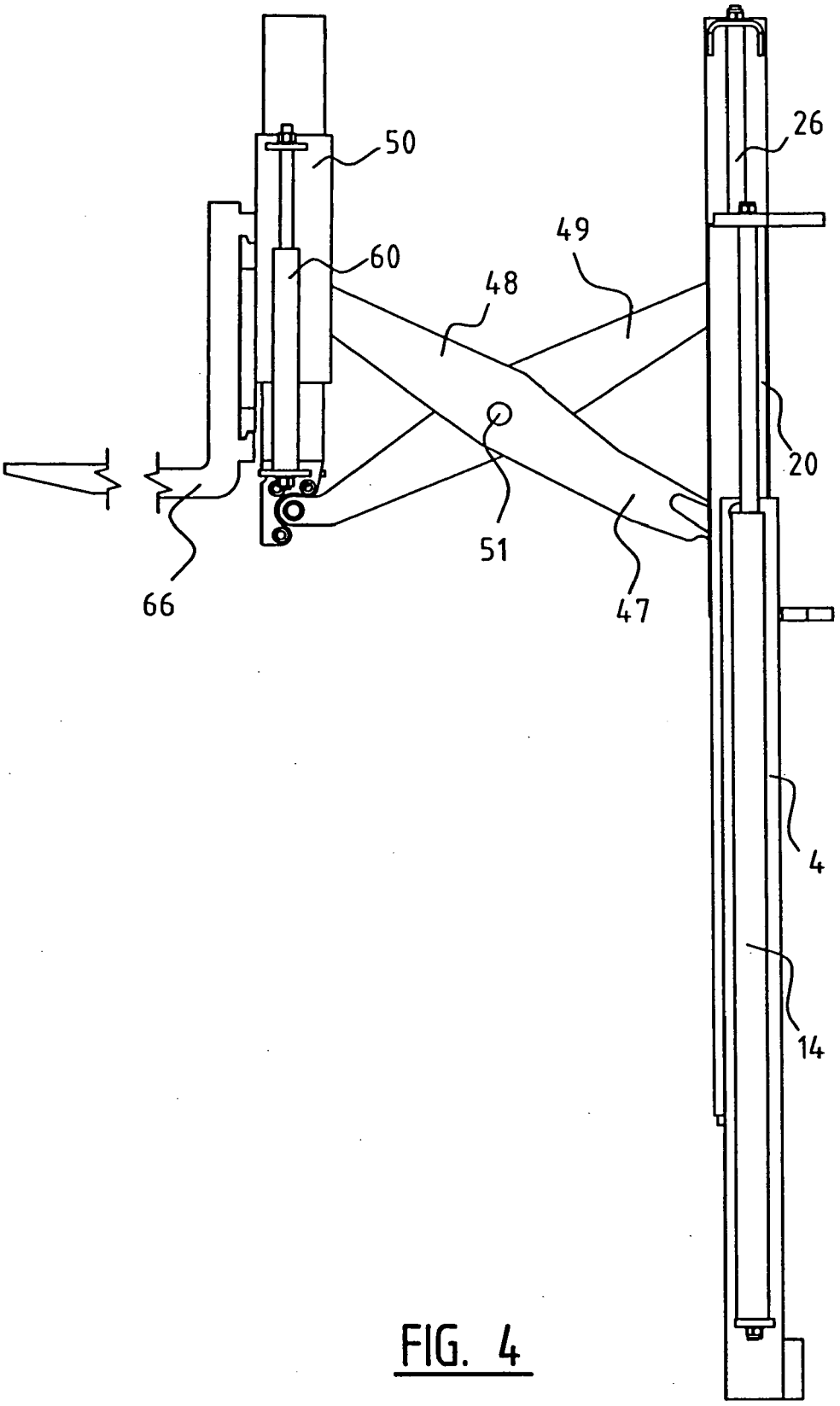

FIG. 4