



(12) **EUROPEAN PATENT APPLICATION**

(43) Date of publication:
13.08.2008 Bulletin 2008/33

(51) Int Cl.:
E04H 17/26 (2006.01)

(21) Application number: **08150985.3**

(22) Date of filing: **01.02.2008**

(84) Designated Contracting States:
AT BE BG CH CY CZ DE DK EE ES FI FR GB GR HR HU IE IS IT LI LT LU LV MC MT NL NO PL PT RO SE SI SK TR
Designated Extension States:
AL BA MK RS

(30) Priority: **01.02.2007 IE 20070059**

(71) Applicants:
• **Brennan, Joseph Anthony**
Johnstown
Kilkenny (IE)
• **Brennan, Michael Richard**
Johnstown
Kilkenny (IE)

(72) Inventors:
• **Brennan, Joseph Anthony**
Johnstown
Kilkenny (IE)
• **Brennan, Michael Richard**
Johnstown
Kilkenny (IE)

(74) Representative: **Schütte, Gearoid et al**
Cruickshank & Company
8A Sandford Business Centre
Sandford
Dublin 18 (IE)

(54) **A post driver**

(57) A post driver (1) has a support frame (2) with means (3) for attachment to a carrier vehicle. A mast (4) is mounted on the support frame (2). A hammer (5) is slidably mounted on the mast (4) for movement between raised and lowered positions on the mast (4). A hammer actuating assembly (8) is operable for raising the hammer (5) on the mast (4) for release to drive a post. The hammer actuating assembly (8) has a hammer lifting rope (10) having a first end (11) attached to the hammer (5) and a second end (20) attached to the mast (4), said rope (10) extending outwardly from the hammer (5) and around a fixed pulley (15) which is rotatably mounted on the mast (4) and then downwardly and around a movable pulley (18) and then upwardly to an anchor point (19) on the mast (4) to which the second end (20) of the rope (10) is attached. Drive means (26) is operable for moving the movable pulley (18) away from the fixed pulley (15) for raising the hammer (5). The movable pulley (18) is rotatably mounted on a carriage (25), said carriage (25) slidably engaging the mast (4). The drive means (26) is a ram connected between the carriage (25) and a ram mount (29) on the mast (4) below the carriage (25).

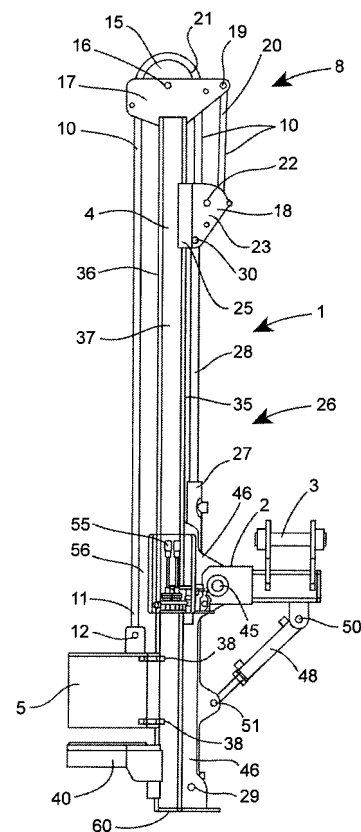


Fig. 2

Description

[0001] This invention relates to post drivers for driving posts into the ground.

[0002] We have described a number of post drivers for mounting on the three point linkage of a tractor in our earlier patent application - Publication No. GB 2,420,367. These essentially comprise a support frame for attachment to a tractor or the like, a mast on the support frame on which a hammer is slidably mounted for movement between raised and lowered positions and means for raising the hammer on the mast for release to drive a post.

[0003] The invention is particularly concerned with post drivers of the type including:

a support frame with means for attachment to a carrier vehicle,

a mast mounted on the support frame,

a hammer slidably mounted on the mast for movement between raised and lowered positions on the mast,

a hammer actuating assembly for raising the hammer on the mast for release to drive a post,

said hammer actuating assembly including a hammer lifting rope having a first end attached to the hammer and a second end attached to the mast, said rope extending upwardly from the hammer and around a fixed pulley which is rotatably mounted on the mast and then downwardly and around a movable pulley and then upwardly to an anchor point on the mast to which said second end of the rope is attached, and

drive means for moving the movable pulley away from the fixed pulley for raising the hammer.

[0004] Examples of this type of post drive are to be found in the prior art documents GB 2400130 ; US 2,659,583 and US 2,476,390.

[0005] The present invention is directed towards providing an improved post driver of relatively simple and lightweight construction which is cheap to manufacture and is reliable in operation.

Summary of the Invention

[0006] The present invention is characterised in that the movable pulley is rotatably mounted on a carriage, said carriage slidably engaging the mast, and the drive means is operably connected to the carriage for sliding the carriage on the mast.

[0007] In one embodiment, the mast comprises an I-section beam having an inner flange and an outer flange which are substantially parallel and spaced-apart, said

flanges being interconnected by an intermediate web which is substantially perpendicular to said flanges, the carriage being slidably mounted on the inner flange and the hammer being slidably mounted on the outer flange.

[0008] In another embodiment, a pair of spaced-apart reinforcing plates are mounted at a lower end of the mast, said reinforcing plates being substantially parallel and extending rearwardly outwardly from the inner flange of the mast and being substantially perpendicular thereto.

[0009] In another embodiment, the mast is mounted on the support frame by means of the reinforcing plates.

[0010] In another embodiment, the drive means is a ram mounted between the reinforcing plates and the movable pulley.

[0011] In a further embodiment, the ram is mounted at a lower end of the reinforcing plates and extends upwardly between the reinforcing plates, said reinforcing plates and the inner flange of the mast forming a housing for reception of the ram.

[0012] In another embodiment, a foot member is mounted at a lower end of the mast extending laterally outwardly therefrom.

[0013] In another embodiment, the fixed pulley has a diameter greater than the depth of the mast and said fixed pulley is rotatably mounted on the mast such that a circumferential rope guide channel of the fixed pulley projects forwardly of the outer flange and rearwardly of the inner flange of the mast.

[0014] In another embodiment, the drive means is a ram connected between the carriage and a ram mount on the mast below the carriage.

[0015] In another embodiment, a pulley mount is provided at the top of the mast on which the fixed pulley is rotatably mounted.

[0016] In a further embodiment, the rope anchor point for the second end of the rope is provided on the pulley mount.

[0017] In another embodiment, a post cap associated with the hammer is slidably mounted on the mast beneath the hammer.

[0018] In a further embodiment, the mast is pivotally mounted on the support frame.

[0019] In a particularly preferred embodiment, a tilt ram is mounted between the support frame and the mast, said tilt ram being operable to pivot the mast relative to the support frame.

[0020] In another embodiment, the support frame has means for attachment to an excavator vehicle hitch.

[0021] In another embodiment, said attachment means is engagable with a boom of the excavator vehicle for movement in a plane perpendicular to the plane through which the mast moves under operation of the tilt ram.

[0022] In another arrangement, the support frame has means for attachment to a three point linkage of a tractor vehicle.

Detailed Description of the Invention

[0023] The invention will be more clearly understood by the following description of some embodiments thereof, given by way of example only, with reference to the accompanying drawings, in which:

Fig. 1 is a perspective view of a post driver according to the invention,

Fig. 2 is a side elevational view of the post driver,

Fig. 3 is a perspective view of another post driver according to a second embodiment of the invention, and

Fig. 4 is a side elevational view of the post driver shown in Fig. 3.

[0024] Referring to the drawings and initially to Figs. 1 and 2 thereof, there is illustrated a post driver according to the invention, indicated generally by the reference numeral 1. The post driver 1 has a support frame 2 with an excavator hitch 3 for attachment to a digger vehicle. A mast 4 is mounted on the support frame 2. A hammer 5 is slidably mounted on the mast 4 for movement between a raised position at a top of the mast 4 and a lowered position, as shown in the drawings. A hammer actuating assembly, indicated generally by the reference numeral 8, is operable for raising the hammer 5 on the mast 4 for release to drive a post.

[0025] The actuating assembly 8 includes a hammer lifting rope 10 having a first or outer end 11 attached by a pin 12 between a pair of upstanding lugs 14 on top of the hammer 5. The rope 10 extends upwardly from the hammer 5 and around a fixed pulley 15 which is rotatably mounted by a pivot pin 16 on a pulley mount 17 fixed at a top of the mast 4. The rope 10 then passes downwardly and around a movable pulley 18 and then back upwardly to an anchor point 19 on the pulley mount 17 at the top of the mast 4 to which the second or inner end 20 of the rope 10 is attached.

[0026] The movable pulley 18 has a pulley wheel (not shown) rotatably mounted by a spindle 22 between a pair of substantially parallel spaced-apart mounting plates 23. These mounting plates 23 are attached to a slide block 25 which slidably engages the mast 4. The slide block 25 forms a carriage for the movable pulley 18.

[0027] A hammer lifting ram 26 has a cylinder 27 with an outwardly extending piston rod 28. A lower end of the cylinder 27 is attached by a lower mounting pin 29 at a bottom of the mast 4. An upper end of the piston rod 28 is attached by an upper mounting pin 30 to the movable pulley 18. Retraction of the piston rod 28 into the cylinder 27 slides the movable pulley 18 downwardly on the mast 4, thus raising the hammer 5 on the opposite side of the mast 4. It will be noted that due to the engagement of the rope 10 around the movable pulley 18 movement of the

hammer 5 will be twice the distance of the hammer lifting ram 26 stroke.

[0028] The mast 4 is of I-section having an inner flange 35 and an outer flange 36, said flanges 35, 36 being interconnected by an intermediate web 37. The slide block 25, which forms a carriage for the movable pulley 18, is slidably mounted on the inner flange 35. The slide block is C-shaped in section, wrapping around the inner flange 35 at each side of the inner flange 35. At the opposite side of the mast 4, the hammer 5 is slidably mounted on the outer flange 36, the hammer 5 having slide elements 38 for slidably engaging the outer flange 36. A post cap 40 is also slidably mounted on the outer flange 36 beneath the hammer 5.

[0029] The fixed pulley 15 mounted at a top of the mast 4 has a diameter greater than the depth of the mast 4 and the fixed pulley 15 is rotatably mounted on the mast 4 such that a circumferential rope guide channel of the fixed pulley 15 projects forwardly of the outer flange 36 and rearwardly of the inner flange 35 of the mast 4, as is best seen in Fig. 2. Thus, the rope 10 extends substantially vertically downwardly at opposite sides of the mast 4 to engage the hammer 5 and movable pulley 18 to provide a smooth action when raising and lowering the hammer 5. Also only a single pulley 15 is required to feed the rope 10 around the top of the mast 4.

[0030] The mast 4 is pivotally mounted on the support frame 2 by means of a pivot pin 45 which engages between the support frame 2 and mounting brackets formed by reinforcing plates 46 which extend rearwardly from the mast 4. A pair of spaced-apart reinforcing plates 46 are mounted at a lower end of the mast 4. These reinforcing plates 46 are substantially parallel and extend rearwardly outwardly from the inner flange 35 of the mast 4 and are substantially perpendicular thereto. The ram 26 is mounted at a lower end of the reinforcing plates 46 by means of the lower mounting pin 29 and extends upwardly between the reinforcing plates 46. The reinforcing plates 46 and the inner flange 35 of the mast 4 form a housing for reception of the ram 26.

[0031] A tilt ram 48 is mounted between the support frame 2 and the mast 4 and is operable to tilt the mast 4 relative to the support frame 2. The tilt ram 48 connects to the support frame 2 by pivot pin 50 and to the mast 4 by pivot pin 51 on the reinforcing plates 46.

[0032] A foot member 60 is mounted at a lower end of the mast 4 extending laterally outwardly therefrom. In this case, the foot member 60 is formed by a metal plate.

[0033] It will be noted that the excavator hitch 3 extends in a direction perpendicular to the tilt ram 48. Thus, the excavator hitch 3 is engagable with a boom of an excavator vehicle in a plane perpendicular to the plane through which the mast 4 moves under operation of the tilt ram 48. Thus, tilting of the mast 4 in two mutually perpendicular directions can be achieved by operation of the tilt ram 48 and by a ram on the boom of the excavator vehicle.

[0034] Hydraulic control levers 55 for operation of the

rams 26, 48 are provided at a control station 56 mounted at one side of the mast 4. The rams 26, 48 can conveniently be connected to an hydraulic power supply on the vehicle on which the post driver 1 is mounted for operation of the rams 26, 48.

[0035] In use, the post driver 1 is positioned at a post with the cap 40 sitting on top of the post. The hammer lifting ram 26 is operated by retracting the piston rod 28 into the cylinder 27 to pull down the movable pulley 18, thus raising the hammer 5 on the mast 4. Upon releasing ram pressure, the hammer 5 drops downwardly striking the cap 40 and driving the post into the ground.

[0036] It will be appreciated that other arrangements for pulling the movable pulley 18 downwardly on the mast 4 to raise the hammer 5 may be provided. Further, different attachments for mounting the support frame 2 on a carrier vehicle may be provided. In the embodiment shown, an excavator hitch 3 is provided on the support frame 2. However, the support frame 2 could be adapted for attachment to the three point linkage of a tractor, for example.

[0037] Figs. 3 and 4 show another post driver, indicated generally by the reference numeral 80. Parts similar to those described previously are assigned the same reference numerals. In this case, the post driver 80 is adapted for mounting on the three point linkage of a tractor. Lower mounting brackets 81 and upper mounting brackets 82 are provided for attachment to the three point linkage of a tractor. A box section foot member 84 extends laterally outwardly at a lower end of the mast 4. The lower mounting brackets 81 are attached at outer ends of the foot member 84, as shown in the drawings. Forwardly extending arms 86 are provided at each outer end of the foot member 4. The upper mounting brackets 82 are mounted on the reinforcing plates 46.

[0038] It is also envisaged that instead of the rope 10, other types of flexible connector may be provided for lifting the hammer 5, for example, cables, chains and the like.

[0039] Bias means may be provided to aid ram 26 extension and reduce drag on the hammer 5 as it falls. Such bias means may for example comprise a spring mounted between the movable pulley 18 and the pulley mount 17 at the top of the mast 4, said spring being tensioned as the ram 26 pulls down the movable pulley 18. The bias might also possibly be provided by hydraulic pressure in the cylinder 27 to raise the piston rod 28.

[0040] The invention provides a post driver of relatively lightweight, compact, sturdy and cheap construction. The sliding carriage protects the ram and prevents twisting of the movable pulley promoting a smooth action and fast ram operation.

[0041] The invention is not limited to the embodiments hereinbefore described which may be varied in both construction and detail within the scope of the appended claims.

Claims

1. A post driver (1), including:

5 a support frame (2) with means (3) for attachment to a carrier vehicle,
a mast (4) mounted on the support frame (2),
a hammer (5) slidably mounted on the mast (4)
10 for movement between raised and lowered positions on the mast (4),
a hammer actuating assembly (8) for raising the hammer (5) on the mast (4) for release to drive a post,
15 said hammer actuating assembly (8) including a hammer lifting rope (10) having a first end (11) attached to the hammer (5) and a second end (20) attached to the mast (4), said rope (10) extending upwardly from the hammer (5) and around a fixed pulley (15) which is rotatably mounted on the mast (4) and then downwardly
20 and around a movable pulley (18) and then upwardly to an anchor point (19) on the mast (4) to which said second end (20) of the rope (10) is attached,
25 drive means (26) for moving the movable pulley (18) away from the fixed pulley (15) for raising the hammer (5),
30 **characterised in that** the movable pulley (18) is rotatably mounted on a carriage (25), said carriage (25) slidably engaging the mast (4), and the drive means (26) is operably connected to the carriage (25) for sliding the carriage (25) on the mast (4).

35 **2.** A post driver (1) as claimed in claim 1, wherein the mast (4) comprises an I-section beam having an inner flange (35) and an outer flange (36) which are substantially parallel and spaced-apart, said flanges (35, 36) being interconnected by an intermediate web (37) which is substantially perpendicular to said flanges (35, 36), the carriage (25) is slidably mounted on the inner flange (35) and the hammer (5) is slidably mounted on the outer flange (36).

45 **3.** A post driver (1) as claimed in any preceding claim, wherein a pair of spaced-apart reinforcing plates (46) are mounted at a lower end of the mast (4), said reinforcing plates (46) being substantially parallel and extending rearwardly outwardly from the inner flange (35) of the mast (4) and being substantially perpendicular thereto.

50 **4.** A post driver (1) as claimed in claim 3, wherein the mast (4) is mounted on the support frame (2) by means of the reinforcing plates (46).

55 **5.** A post driver (1) as claimed in claim 3 or claim 4, wherein the drive means is a ram (26) mounted be-

tween the reinforcing plates (46) and the movable pulley (18).

6. A post driver (1) as claimed in claim 5, wherein the ram (26) is mounted at a lower end of the reinforcing plates (46) and extends upwardly between the reinforcing plates (46), said reinforcing plates (46) and the inner flange (35) of the mast (4) forming a housing for reception of the ram (26). 5
10
7. A post driver (1) as claimed in any preceding claim, wherein a foot member (60) is mounted at a lower end of the mast (4) extending laterally outwardly therefrom. 15
8. A post driver (1) as claimed in any preceding claim, wherein the fixed pulley (15) has a diameter greater than the depth of the mast (4) and said fixed pulley (15) is rotatably mounted on the mast (4) such that a circumferential rope guide channel (21) of the fixed pulley (15) projects forwardly of the outer flange (36) and rearwardly of the inner flange (35) of the mast (4). 20
9. A post driver (1) as claimed in any preceding claim, wherein a pulley mount (17) is provided at the top of the mast (4) on which the fixed pulley (15) is rotatably mounted, and the rope anchor point (19) for the second end (20) of the rope (10) is provided on the pulley mount (17). 25
30
10. A post driver (1) as claimed in any preceding claim wherein the mast (4) is pivotally mounted on the support frame (2), a tilt ram (48) is mounted between the support frame (2) and the mast (4), said tilt ram (48) being operable to pivot the mast (4) relative to the support frame (2). 35
11. A post driver (1) as claimed in any preceding claim wherein the support frame (2) has means (3) for attachment to an excavator vehicle hitch. 40
12. A post driver (1) as claimed in claim 11, wherein said attachment means (3) is engagable with a boom of the excavator vehicle for movement in a plane perpendicular to the plane through which the mast (4) moves under operation of the tilt ram (48). 45
13. A post driver (1) as claimed in any preceding claim, wherein a post cap (40) associated with the hammer (5) is slidably mounted on the mast (4) beneath the hammer (5). 50
14. A post driver (80) as claimed in any preceding claim the support frame has means (81,82) for attachment to a three point linkage of a tractor vehicle. 55

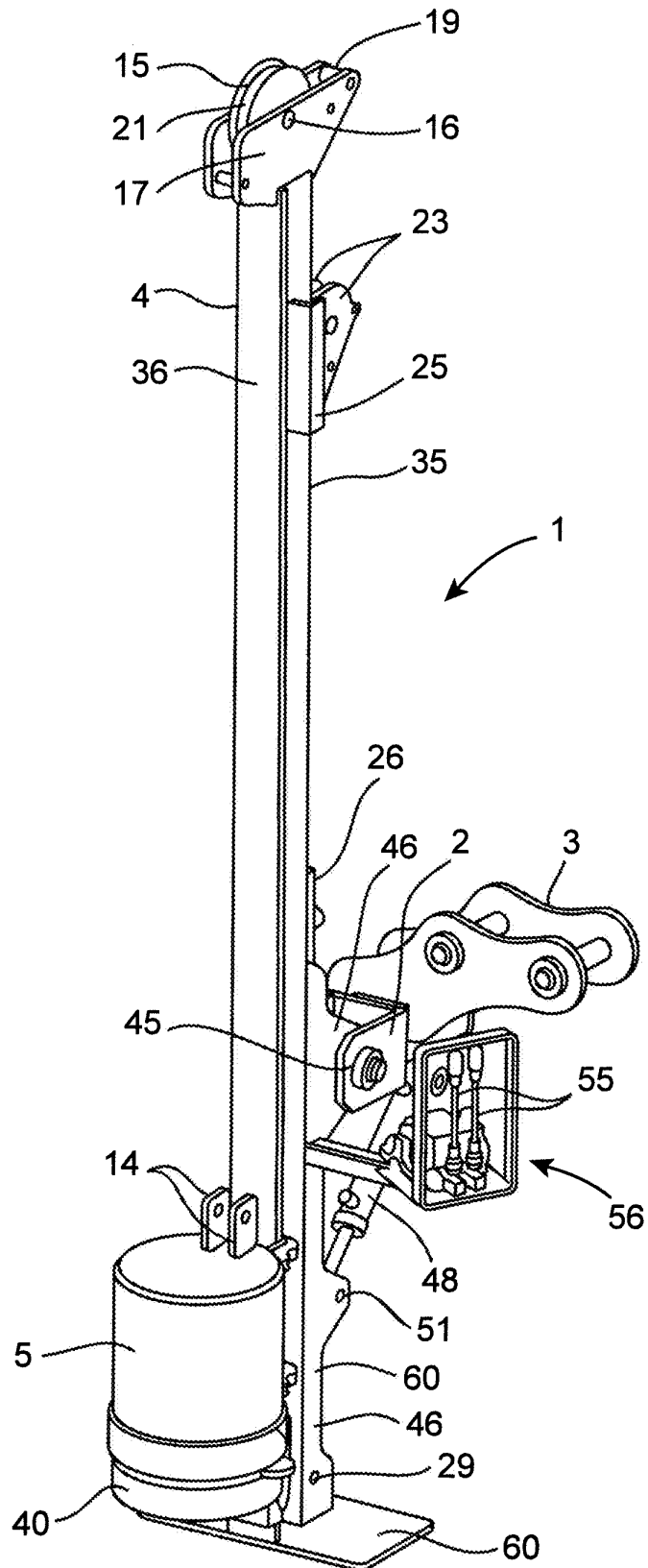


Fig. 1

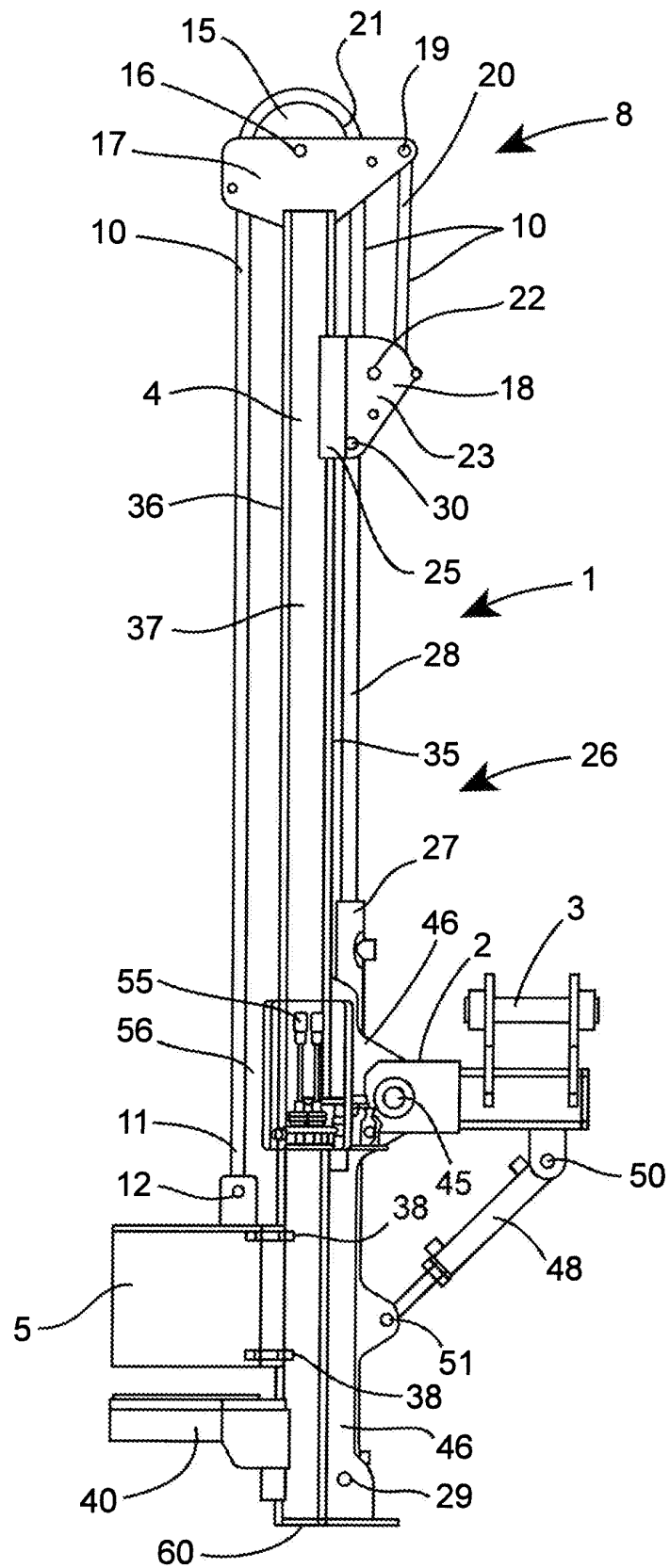


Fig. 2

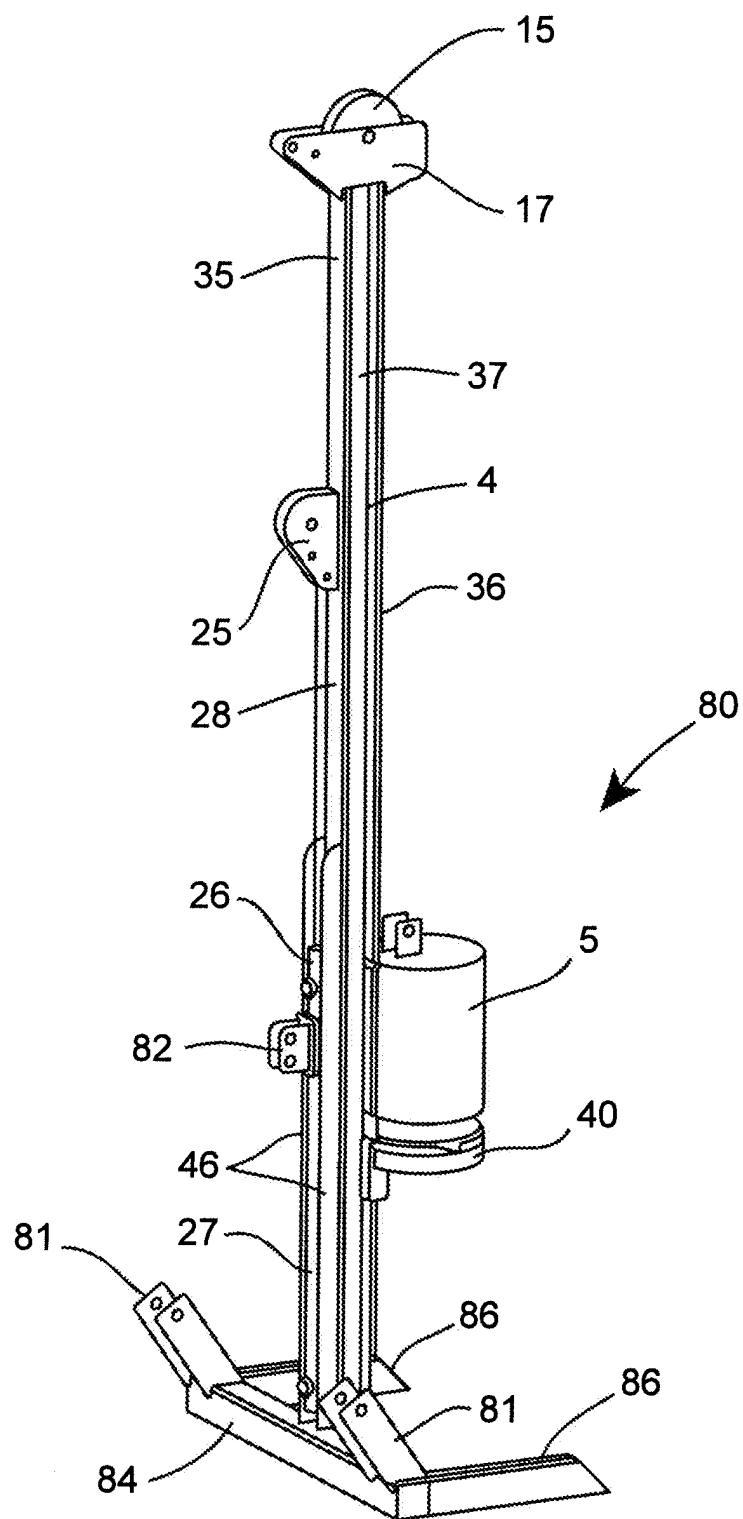


Fig. 3

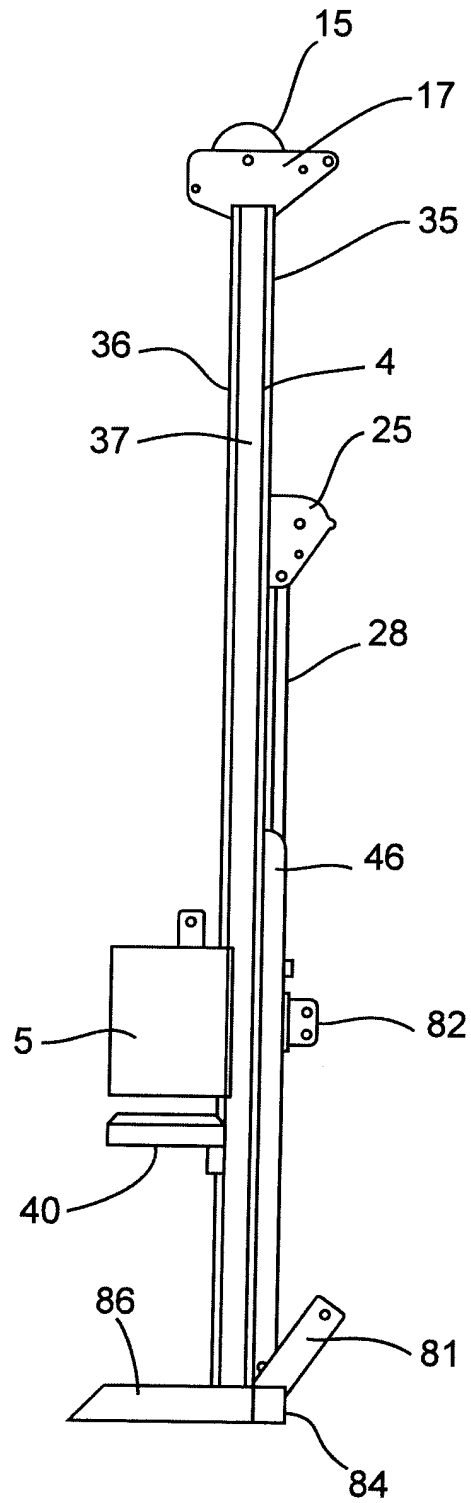


Fig. 4

REFERENCES CITED IN THE DESCRIPTION

This list of references cited by the applicant is for the reader's convenience only. It does not form part of the European patent document. Even though great care has been taken in compiling the references, errors or omissions cannot be excluded and the EPO disclaims all liability in this regard.

Patent documents cited in the description

- GB 2420367 A [0002]
- GB 2400130 A [0004]
- US 2659583 A [0004]
- US 2476390 A [0004]