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(54) **Post driver**

(57) A post driver (1) has a support frame (2) with means (3) for attachment to the three point linkage of a tractor. A hammer (10) is slidably mounted on a mast (5) for driving a post beneath the hammer (10). A rock spike holder (44) carrying a rock spike (41) is pivotally mounted on the mast (5) for movement of the rock spike (41) between a stored position and an in-use position beneath the hammer (10). A spike extraction ram (52) on the mast (5) is operable to raise the rock spike holder (44) from a lowered position to a raised position for extraction of the rock spike (41) from the ground. A spike extraction support leg is provided at a bottom of the mast (5) to engage the ground as the spike is being extracted.

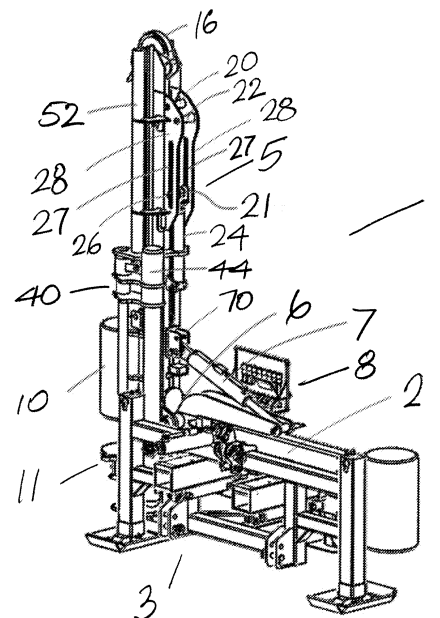


FIG 1

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Description

Introduction

[0001] This invention relates to post drivers for driving posts, such as are used in fencing, into the ground.

[0002] The invention is particularly related to post drivers of the type described in our previous patent application - publication no. EP1887167 and the improvements thereto.

Summary of the Invention

[0003] According to the invention there is provided a post driver including;

a support frame,

a mast mounted on the support frame,

a hammer mounted on the mast and having associated actuating means which is operable for driving a post with the hammer,

a rock spike holder mounted on the mast for supporting a rock spike beneath the hammer,

a spike extraction ram mounted on the mast for engagement with the rock spike holder, said spike extraction ram being operable to raise the rock spike holder on the mast for extraction of the rock spike from the ground.

[0004] In a preferred embodiment a support leg is mounted on the mast for movement between a retracted stored position and an extended ground-engaging position. The support leg may conveniently be actuated by means of a ram mounted on the mast. The support leg can be extended to the ground-engaging position prior to operation of the extracting ram for extracting the rock spike from the ground.

[0005] In another embodiment the spike holder is movably mounted on the mast for movement of the rock spike between a stored position away from the hammer and an in-use position beneath the hammer.

[0006] Advantageously the rock spike is movable on the mast independently of the extraction ram for movement between the stored position and the in-use position. This advantageously makes the system very easy to operate and requires very little manual work by the operator.

[0007] In another embodiment the spike holder is pivotally mounted on the mast.

[0008] In another embodiment the spike holder is slidably mounted on the mast for movement between a raised position and a lowered position.

[0009] In a further embodiment the spike holder has a sleeve which is slidably mounted on a vertical guide rail on the mast, the spike extraction ram being operably con-

nected to the sleeve for movement of the sleeve along the guide rail.

[0010] In another embodiment the spike holder has a collar which is slidably engagable with the rock spike which is movable through the collar, the rock spike having a stop to limit downward movement of the rock spike through the collar.

[0011] In a preferred embodiment the stop is formed by a flanged head of the rock spike.

[0012] In another embodiment the mast comprises a telescopic mast which is mounted on the support frame comprising a first mast part slidably mounted on a second mast part, and a mast ram is operable for sliding the first mast part relatively to the second mast part, the hammer is slidably mounted on the mast for movement between a raised position and a lowered position on the mast, the hammer being suspended on a lifting line attached to the hammer and passing around a mast pulley on the first mast part and attached to an anchor point on the second mast part such that relative movement of the mast parts moves the hammer on the mast, said line passing around a movable pulley intermediate the mast pulley and the anchor point, said movable pulley being movable on the second mast part for adjustment of the hammer position on the mast.

[0013] In another embodiment the movable pulley is movable by means of a ram.

[0014] In a further embodiment the movable pulley is slidably mounted on the second mast part.

[0015] In another embodiment the movable pulley is mounted on a slide pin, the slide pin slidably engaging a complementary guide on the second mast part.

[0016] In another embodiment the guide comprises associated elongate guide slots in a pair of spaced-apart mounting brackets on the second mast part.

[0017] In another embodiment the invention provides a post driver, including:

a support frame;

a telescopic mast mounted on the support frame comprising a first mast part slidably mounted on a second mast part,

a mast ram which is operable for sliding the first mast part relative to the second mast part,

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

the hammer being suspended on a lifting line attached to the hammer and passing around a mast pulley on the first mast part and attached to an anchor point on the second mast part such that relative movement of the mast parts moves the hammer on the mast,

said line passing around a movable pulley intermediate the mast pulley and the anchor point, said movable pulley being movable on the second mast part for adjustment of the hammer position on the mast.

Brief Description of the Drawings

[0018] 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 another perspective view of the post driver;

Fig. 3 is a side elevational view of the post driver;

Fig. 4 is a front elevational view of the post driver;

Fig. 5 is a rear elevational view of the post driver;

Fig. 6 is a detail side elevational view showing a mast portion of the post driver;

Fig. 7 is a view similar to Fig. 6 showing a hammer mounted on the mast in another position of use;

Fig. 8 is a detail side elevational view of the mast shown in another position of use;

Fig. 9 is a detail perspective view showing portion of the post driver;

Fig. 10 is a detail perspective view showing a pivot pin arrangement used in the post driver;

Fig. 11 is a detail perspective view showing portion of the post driver;

Fig. 12 is a detail perspective view showing portion of the post driver; and

Fig. 13 to 17 are various perspective views showing operation of a rock spike forming portion of the post driver.

Detailed Description of Preferred Embodiments

[0019] Referring to the drawings there is illustrated a post driver according to the invention indicated generally by the reference numeral 1. Much of the construction of the post driver 1 is similar to the post drivers already described in our earlier European Patent Application - Publication No. EP 1887167 and need not be repeated here. Essentially the post driver 1 comprises a support frame 2 having means 3 for attachment to the three point

linkage of a tractor vehicle. A telescopic mast 5 is pivotally mounted on the support frame 2 by means of a pivot pin 6. A mast tilt ram 7 extends between the support frame 2 and the mast 5 for tilting the mast 5 about the pivot pin 6 on the support frame 2. Hydraulic controls 8 are provided for operation of various rams used in the post driver 1. Most of the hydraulic lines supplying the various rams have been omitted for clarity reasons. A hammer 10 is vertically slidable on the mast 5 for driving a post 9 (Fig. 9) located below the hammer 10 in use into the ground. A cap 11 is independently slidable on the mast 5 beneath the hammer 10 for supporting a post 9 as it is being driven into the ground by the hammer 10.

[0020] Referring now in particular to Figs 6 to 8, the mast 5 comprises a lower fixed mast portion 14 and an upper movable mast portion 15 which is slidably mounted on the fixed mast portion 14. A ram (not shown) is operable for sliding the movable mast portion 15 on the fixed mast portion 14. A mast pulley 16 is mounted on top of the moving mast part 15. A hammer lifting line 18 has an outer end 19 fixed to the hammer 10. The lifting line 18 passes around the mast pulley 16, over a guide pulley or pin 20, around a movable hammer adjustment pulley 21 and is secured to an anchor point 22. The pin 20, pulley 21 and anchor point 22 are mounted on the fixed mast portion 14. The movable pulley 21 is mounted on a ram 24 which is operable to move the movable pulley 21 between a fully raised position as shown in Fig. 6 and a fully lowered position as shown in Fig. 7. By operation of the ram 24 the movable pulley 21 can be located at any desired position between said fully raised position and fully lowered position. Thus the effective length of the hammer lifting line 18 and the position of the hammer 10 on the mast 5 can be adjusted to accommodate posts 9 of different height.

[0021] Once the desired initial rest position for the hammer 10 (i.e. the effective lifting line 18 length) has been selected appropriately the mast 5 can be operated in the usual way, raising the moving mast part 15 on the fixed mast part 14 to raise the hammer 10 on the mast 5 for release to drop and drive a post 9 located beneath the hammer 10 into the ground.

[0022] A laterally projecting pin 26 on the movable pulley 21 slidably engages associated elongate guide slots 27 in a pair of spaced-apart parallel mounting brackets 28 on the fixed mast portion 14. This ensures the movable pulley 21 moves vertically.

[0023] Referring now in particular to Figs. 9 and 10, the mast 5 is pivotally mounted on the support frame 2 by the pivot 6. The pivot 6 includes a main pivot pin 30 rotatably supported in maintenance free self lubricating polymer bearings 31 carried in a bearing housing 32 which provide an extended and trouble free life. A C-shaped mounting bracket 33 has an inner end 34 fixed to the mast 5 and outwardly extending arms 35 which engage the main pivot pin 30 for pivoting movement of the mast 5 on the mast main pivot pin 30.

[0024] A mounting bracket 36 for the mast tilt ram 7

has an inner end 37 attached to the bearing housing 32. The mast tilt ram 7 has one end pivotally attached to a mounting pin 38 at an outer end 39 of the mounting bracket 36 and the other end pivotally connected to an associated support bracket 70 (Fig. 2) on the mast 5.

[0025] The mounting bracket 36 forms portion of a side shift slide assembly which essentially comprises two spaced-apart parallel beams 72, 73 which are telescopically slidably mounted within complementary spaced-apart parallel sleeves 74, 75 respectively on the support frame 2. Outer ends of the beams 72, 73 are interconnected by a cross-member 76 extending therebetween. The mounting bracket 36 is attached to the upper sliding beam 72. A ram 77 (Fig. 5) is mounted between an underside of the lower sleeve 75 and an underside of the lower sliding beam 73 and is operable for sliding the beams 72, 73 relatively to the sleeves 74, 75.

[0026] Referring now in particular to Figs. 11 to 17, the post driver 1 incorporates a rock spike assembly 40. The rock spike assembly 40 comprises a spike 41 having a flanged head 42. The spike 41 is slidably supported in a spike holder 44 which essentially comprises a cylindrical collar. The spike holder 44 is connected by brackets 46 to a sleeve 47 which is slidably mounted on a vertical guide rail 48. The guide rail 48 is mounted between upper and lower support brackets 49 on the mast 5. A cylindrical band 50 is rotatably mounted on the sleeve 47 and is connected to an extraction ram 52. The extraction ram 52 has a cylinder 53 fixed on the mast 5. A downwardly extending piston rod 54 is engaged with the band 50.

[0027] An hydraulic support leg 58 (Fig. 17) is provided at a rear of the mast 5. The support leg 58 essentially comprises a cylinder 59 with a downwardly depending piston rod 60 terminating in a foot plate 61. The support leg 58 is operable to move the foot plate 61 between a raised inoperative position and a lowered ground-engaging position as shown in Fig. 17.

[0028] Fig. 13 shows the rock spike 40 in the stored position. When required for use, with the hammer 10 and cap 11 raised, the spike 41 and spike holder 44 can be pivoted on the guide rail 48 by means of the sleeve 47 into the in-use position shown in Fig. 14 in which the rock spike 40 is positioned beneath the hammer 10. Then, as shown in Fig. 15 the extraction ram 52 is extended, sliding the band 50 downwardly on the guide rail 48, thus lowering the sleeve 47 and thus the spike holder 44 until the spike holder 44 engages the ground. The sleeve 47 is further lowered by the ram 52 sliding the spike holder 44 downwardly on the spike 41. The cap 11 is then lowered into engagement with the head 42 of the spike 41 and the hammer 10 is operated in the usual way for driving the spike 41 into the ground. When the spike 41 has been driven to the correct depth the hydraulic support leg 58 is lowered into engagement with the ground and the extraction ram 52 is operated retracting the piston rod 54 into the cylinder 53 raising the sleeve 47 and spike holder 44 which engages the flanged head 42 on the spike 41 to pull the spike 41 from the ground. It will be appreciated

that the hydraulic support leg 58 protects the post driver 1 from any high stresses which might occur during the spike extraction process. It will further be appreciated that the rock spike 40 arrangement is such that the hinging system employed allows the actual spike 41 to be manoeuvred independently of its extracting ram 52 and other heavy components. This makes the system very easy to operate and requires very little manual work by the operator.

[0029] 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;

a support frame (2),
a mast (5) mounted on the support frame (2),
a hammer (10) mounted on the mast (5) and having associated actuating means which is operable for driving a post with the hammer (10),
characterised in that a rock spike holder (44) is mounted on the mast (5) for supporting a rock spike (41) beneath the hammer,
a spike extraction ram (52) mounted on the mast (5) for engagement with the rock spike holder (44), said spike extraction ram (52) being operable to raise the rock spike holder (44) on the mast (5) for extraction of the rock spike (41) from the ground.

2. The post driver (1) as claimed in claim 1 wherein a spike extraction support leg (58) is mounted on the mast (5) for movement between a retracted stored position and an extended ground-engaging position.

3. The post driver (1) as claimed in claim 2 wherein the support leg (58) is actuated by means of a ram (59, 60) mounted on the mast (5).

4. The post driver (1) as claimed in any preceding claim wherein the spike holder (44) is movably mounted on the mast (5) for movement of the rock spike (41) between a stored position away from the hammer (10) and an in-use position beneath the hammer (10).

5. The post driver (1) as claimed in claim 4 wherein the rock spike (41) is movable on the mast (5) independently of the extraction ram (52) for movement between the stored position and the in-use position.

6. The post driver (1) as claimed in claim 4 or claim 5 wherein the spike holder (44) is pivotally mounted on the mast (5).

7. The post driver (1) as claimed in any of claims 4 to 6 wherein the spike holder (44) is slidably mounted on the mast (5) for movement between a raised position and a lowered position.
8. The post driver (1) as claimed in claim 7 wherein the spike holder (44) has a sleeve (47) which is slidably mounted on a vertical guide rail (48) on the mast (5), the spike extraction ram (52) being operably connected to the sleeve (47) for movement of the sleeve (47) along the guide rail (48).
9. The post driver (1) as claimed in any preceding claim wherein the spike holder (44) has a collar (44) which is slidably engagable with the rock spike (41) which is movable through the collar (44), the rock spike (41) having a stop (42) to limit downward movement of the rock spike (41) through the collar (44).
10. The post driver (1) as claimed in claim 9 wherein the stop is formed by a flanged head (42) of the rock spike (41).
11. The post driver (1) as claimed in any preceding claim wherein:
- a telescopic mast (5) is mounted on the support frame (2) comprising
- a first mast part (15) slidably mounted on a second mast part (14), and a mast ram is operable for sliding the first mast part (15) relative to the second mast part (14),
- the hammer (10) is slidably mounted on the mast (5) for movement between a raised position and a lowered position on the mast (5),
- the hammer (10) being suspended on a lifting line (18) attached to the hammer (10) and passing around a mast pulley (16) on the first mast part (15) and attached to an anchor point (22) on the second mast part (14) such that relative movement of the mast parts (14, 15) moves the hammer (10) on the mast (5),
- said lifting line (18) passing around a movable pulley (21) intermediate the mast pulley (16) and the anchor point (22), said movable pulley (21) being movable on the second mast part (14) for adjustment of the hammer position on the mast (5).
12. The post driver (1) as claimed in claim 11 wherein the movable pulley (21) is movable by means of a ram (24).
13. The post driver (1) as claimed in claim 11 or claim 12 wherein the movable pulley (21) is slidably mounted on the second mast part (14).
14. The post driver (1) as claimed in any preceding claim wherein the movable pulley (21) is mounted on a slide pin (26), the slide pin (26) slidably engaging a complementary guide (27) on the second mast part (14).
15. The post driver (1) as claimed in claim 14 wherein the guide comprises associated elongate guide slots (27) in a pair of spaced-apart mounting brackets (28) on the second mast part (14).

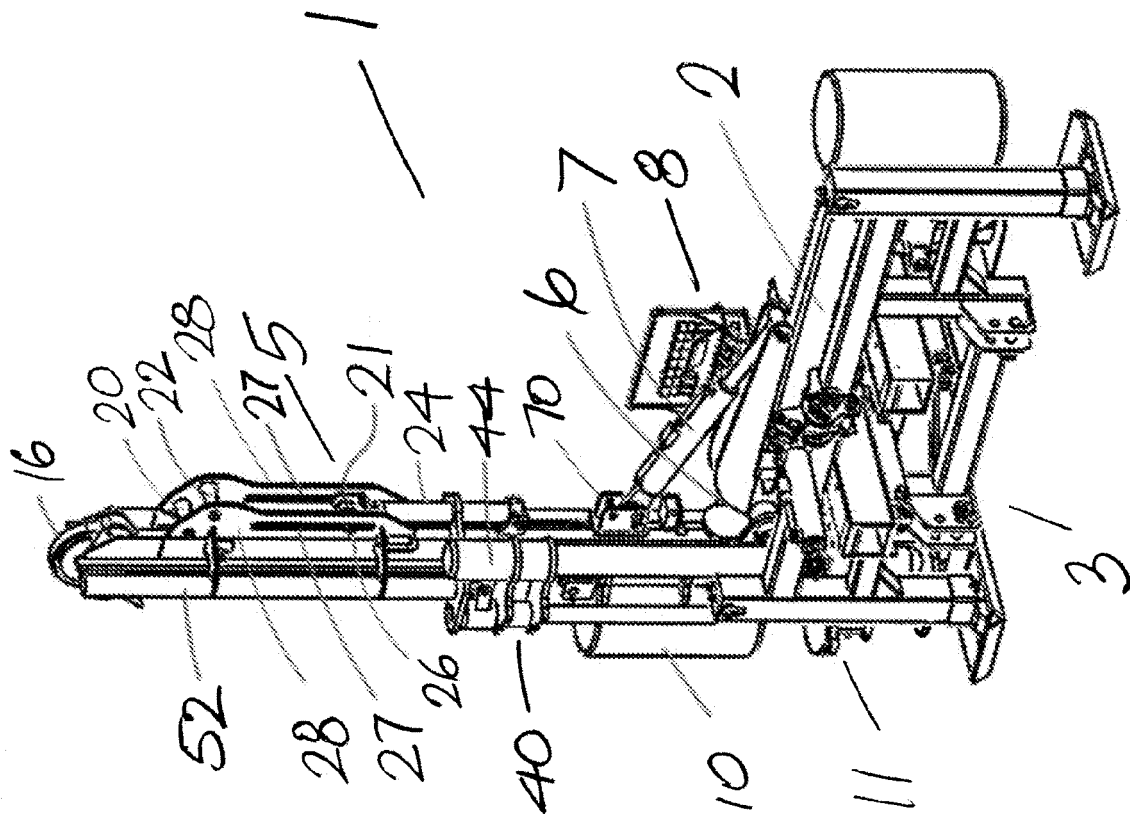


FIG. 1

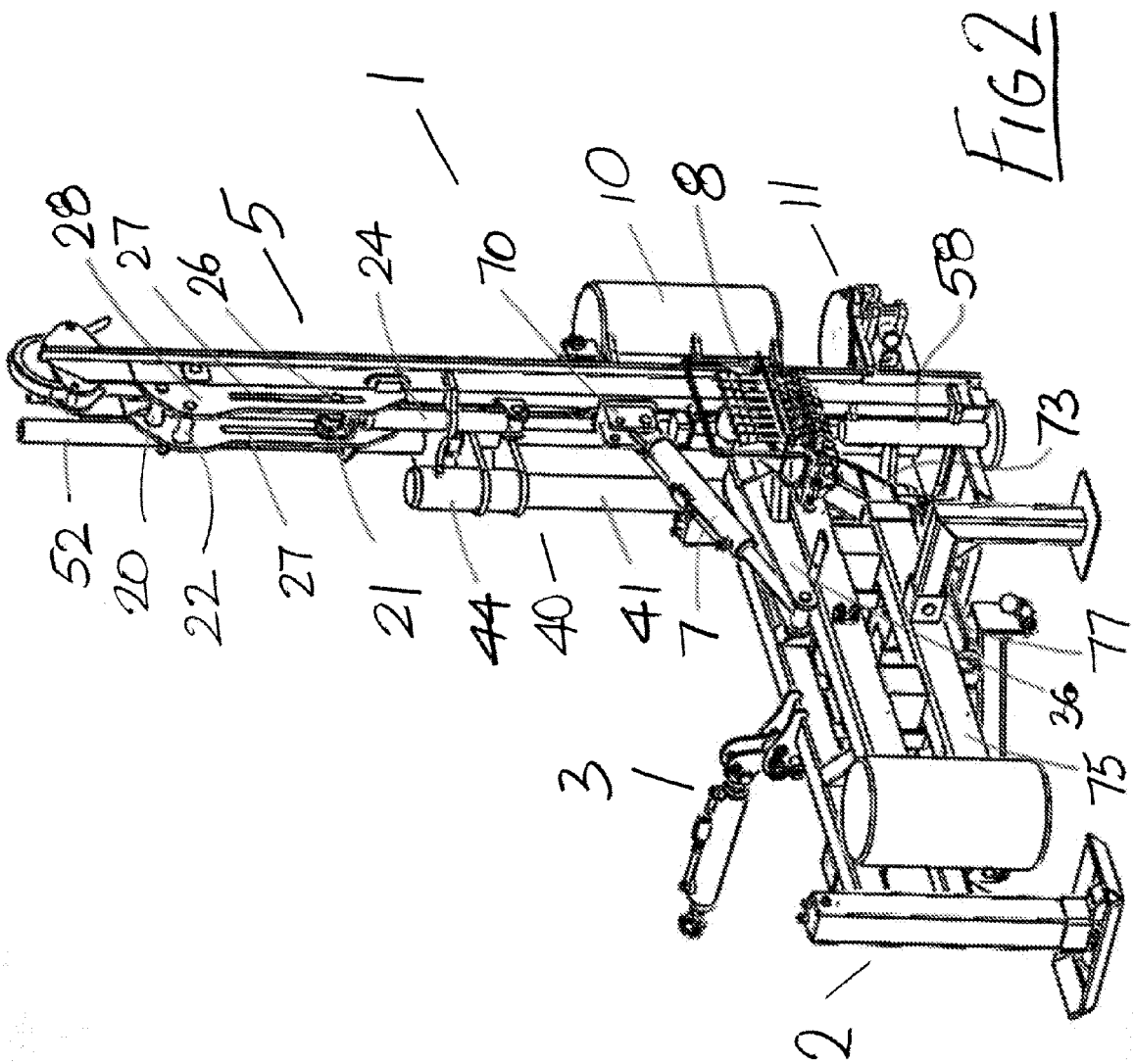
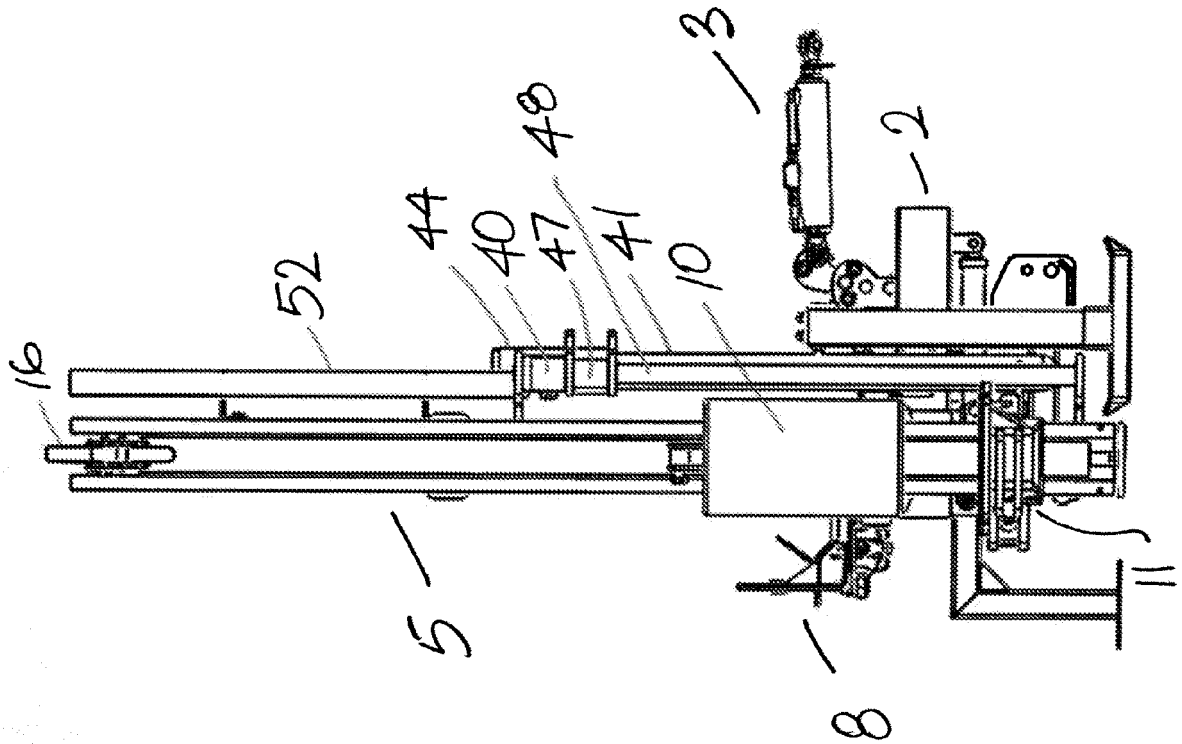
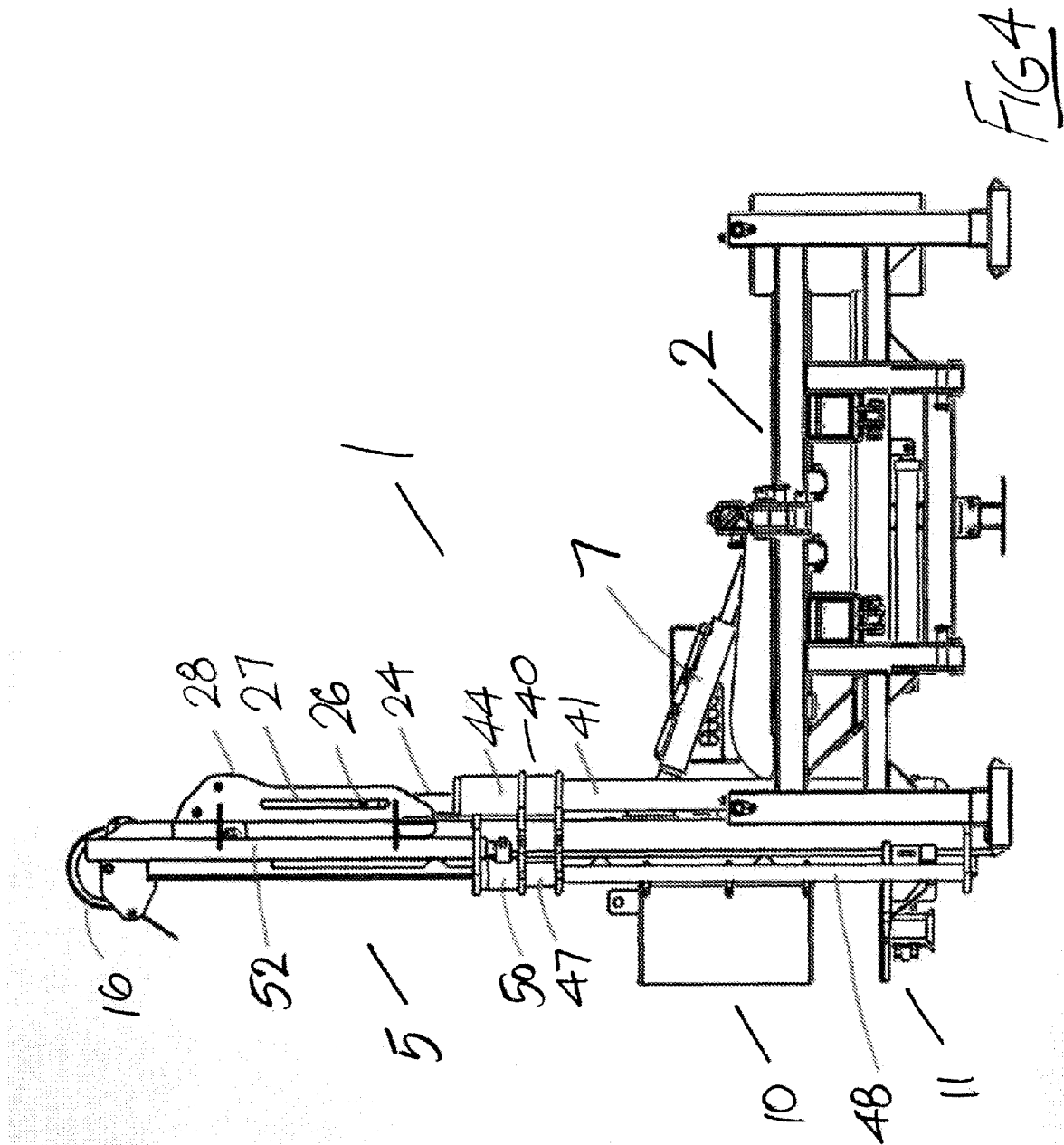
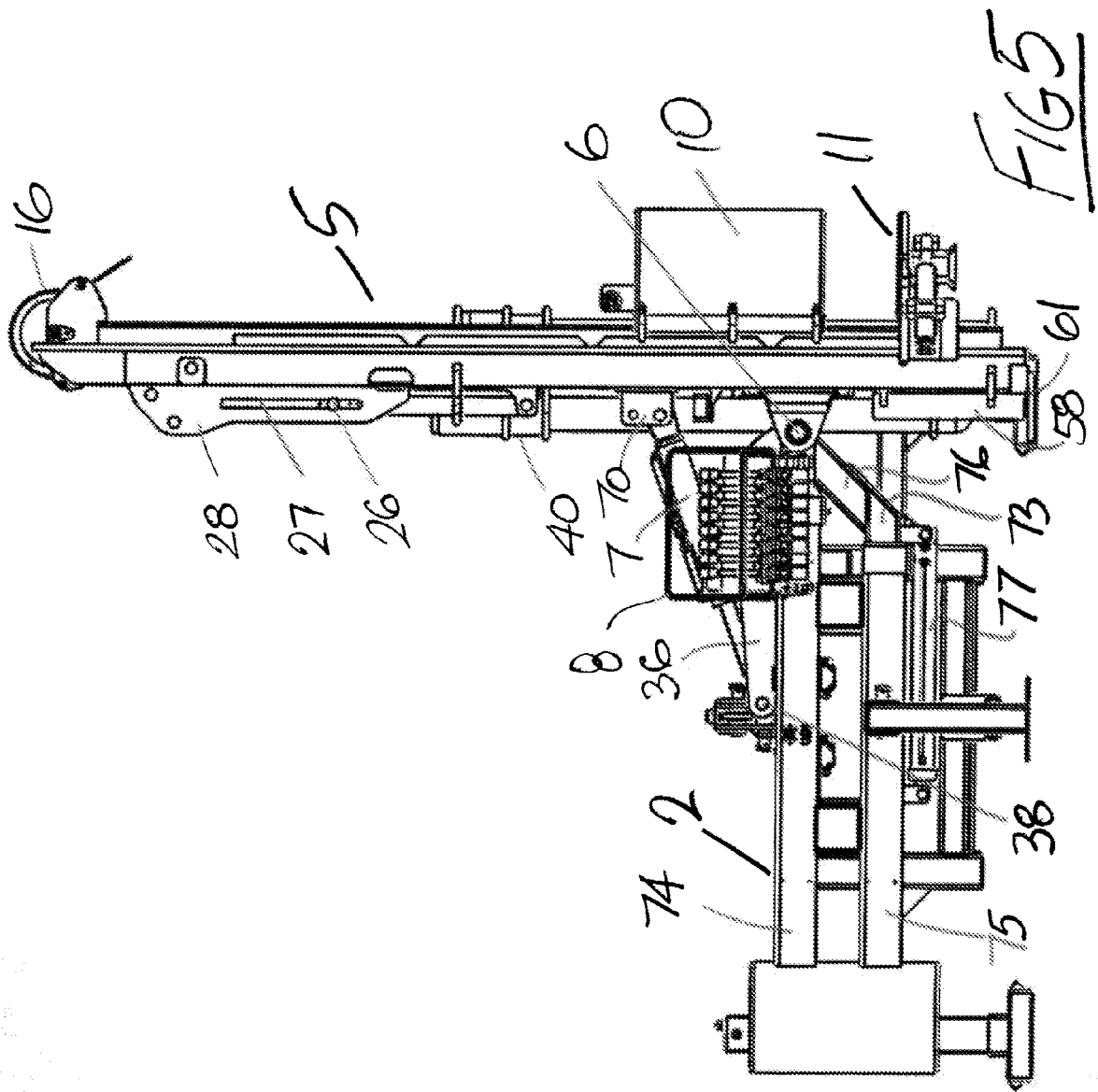


FIG 3







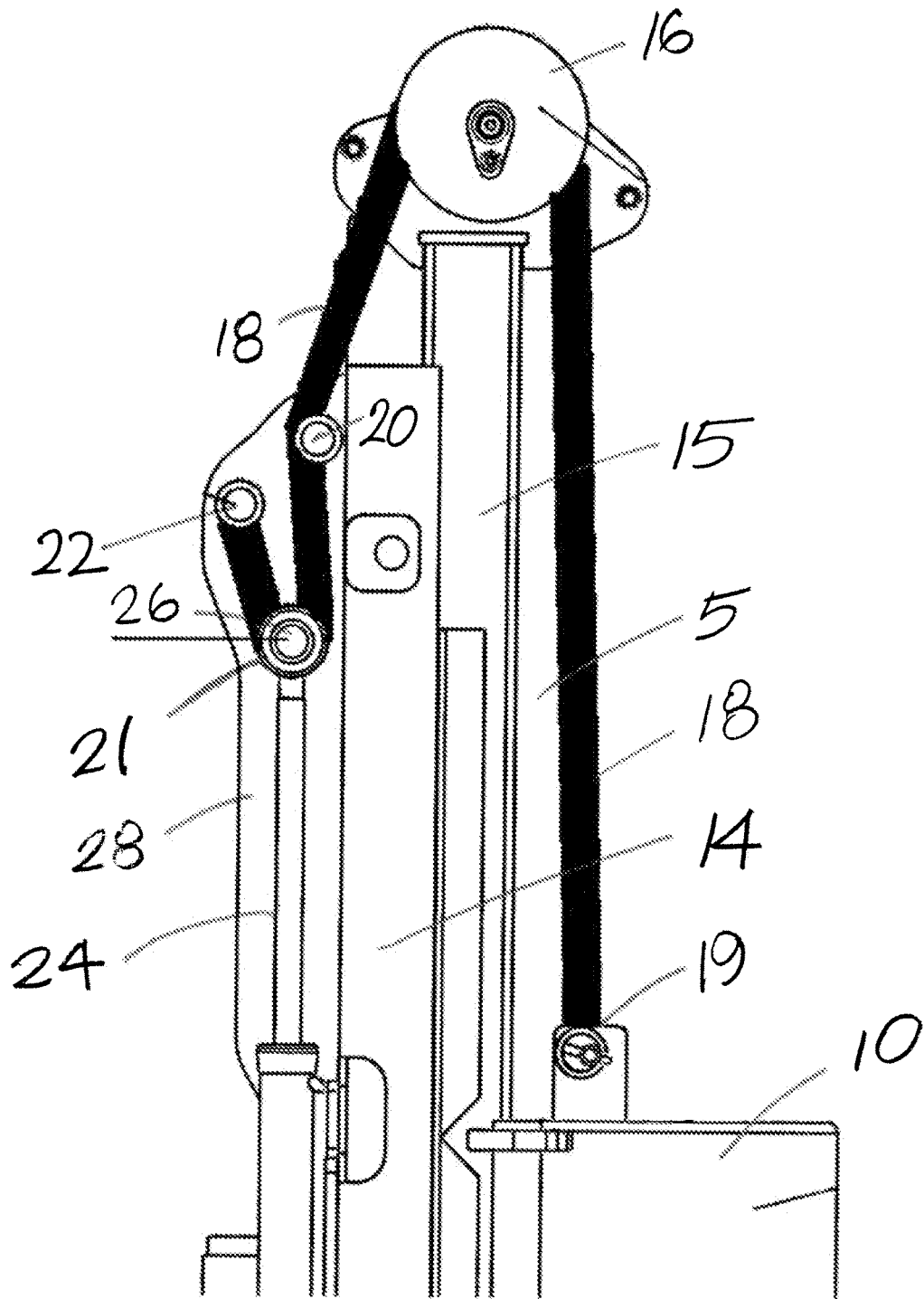


FIG 6

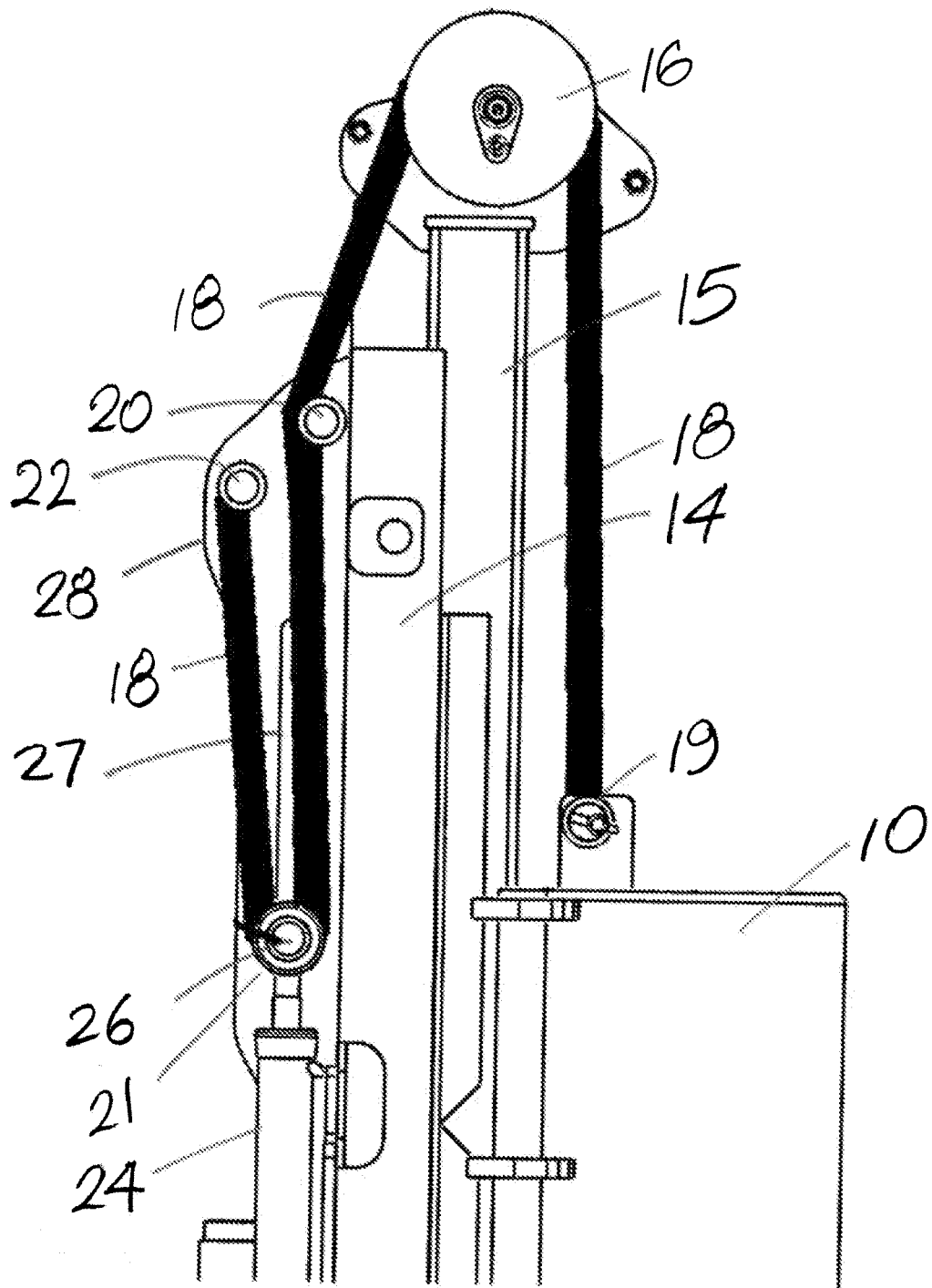


FIG 7

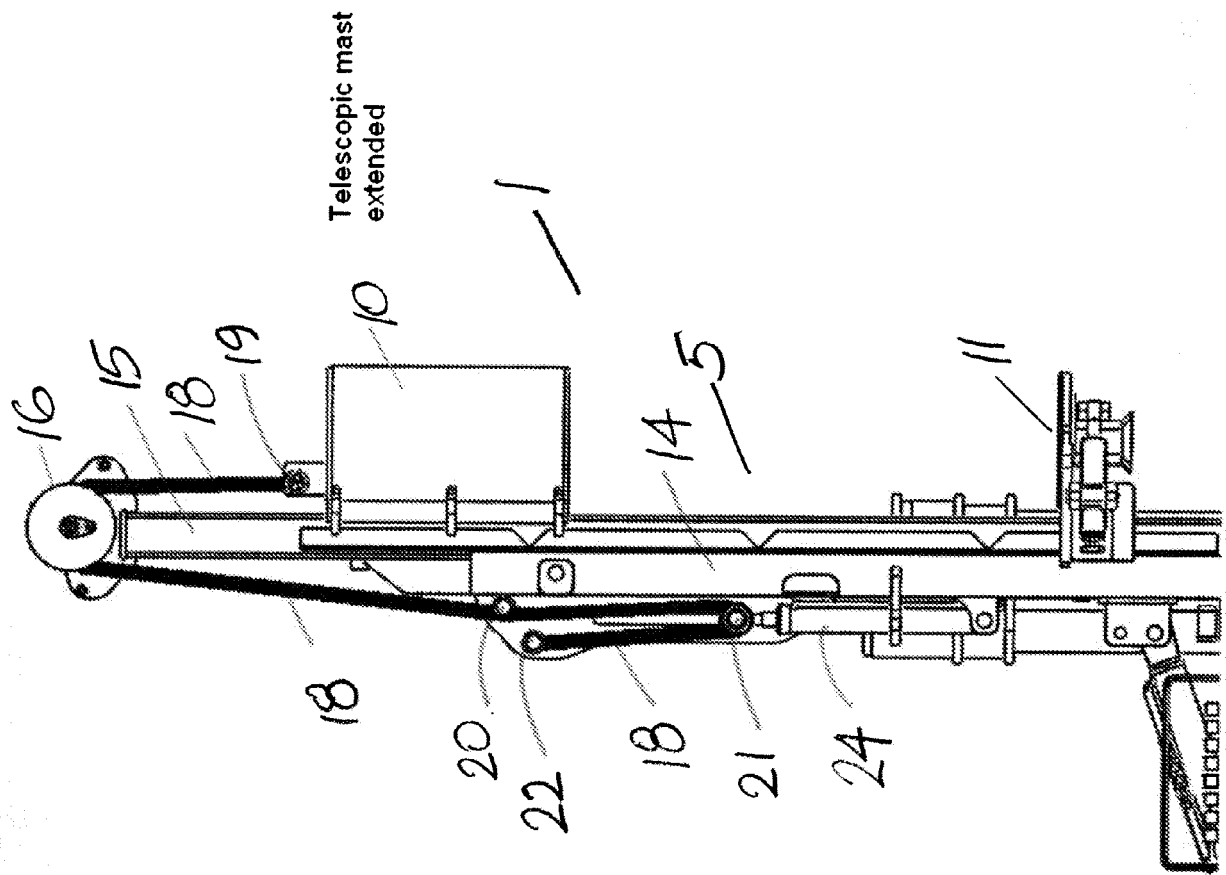
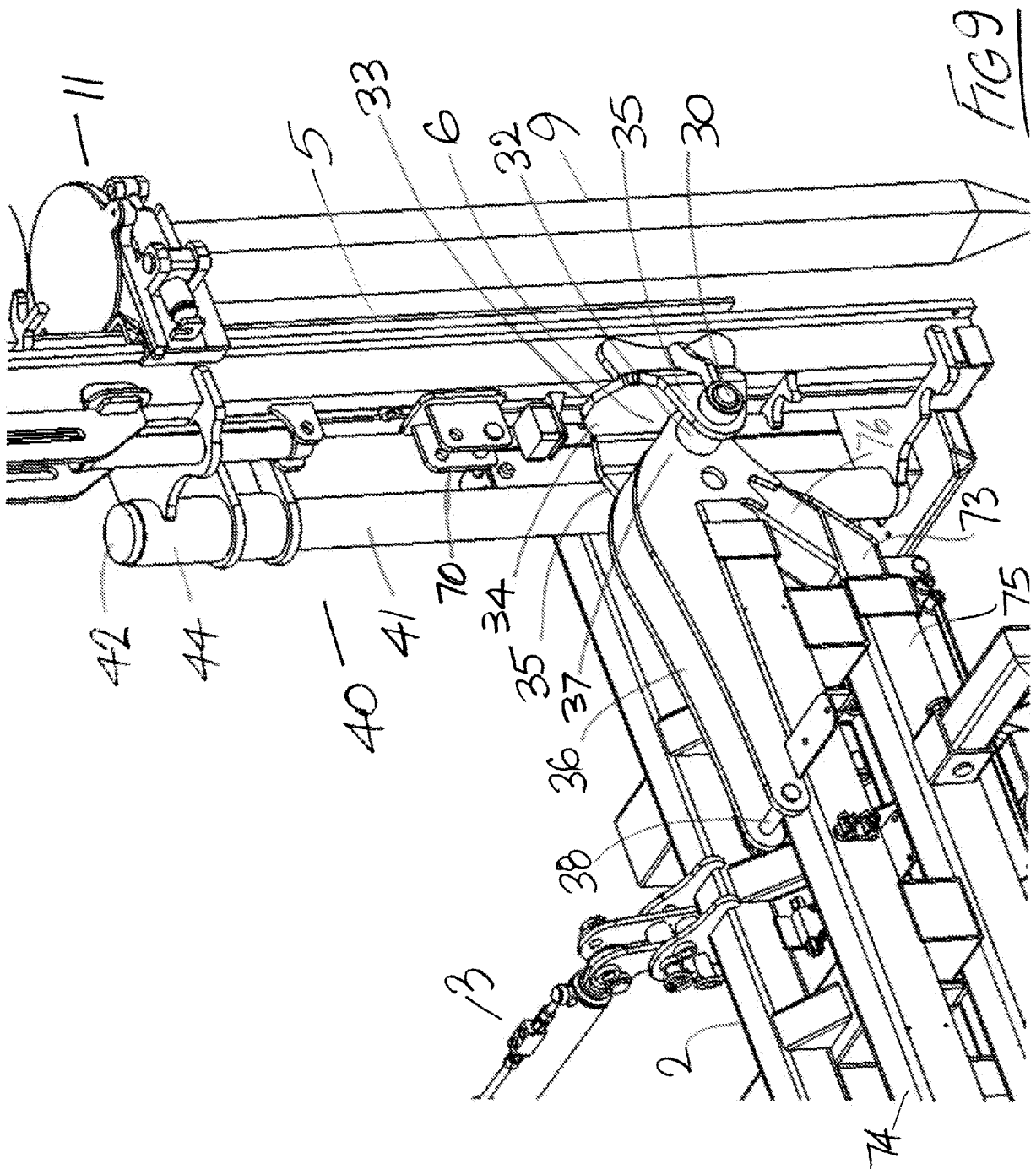


FIG 8



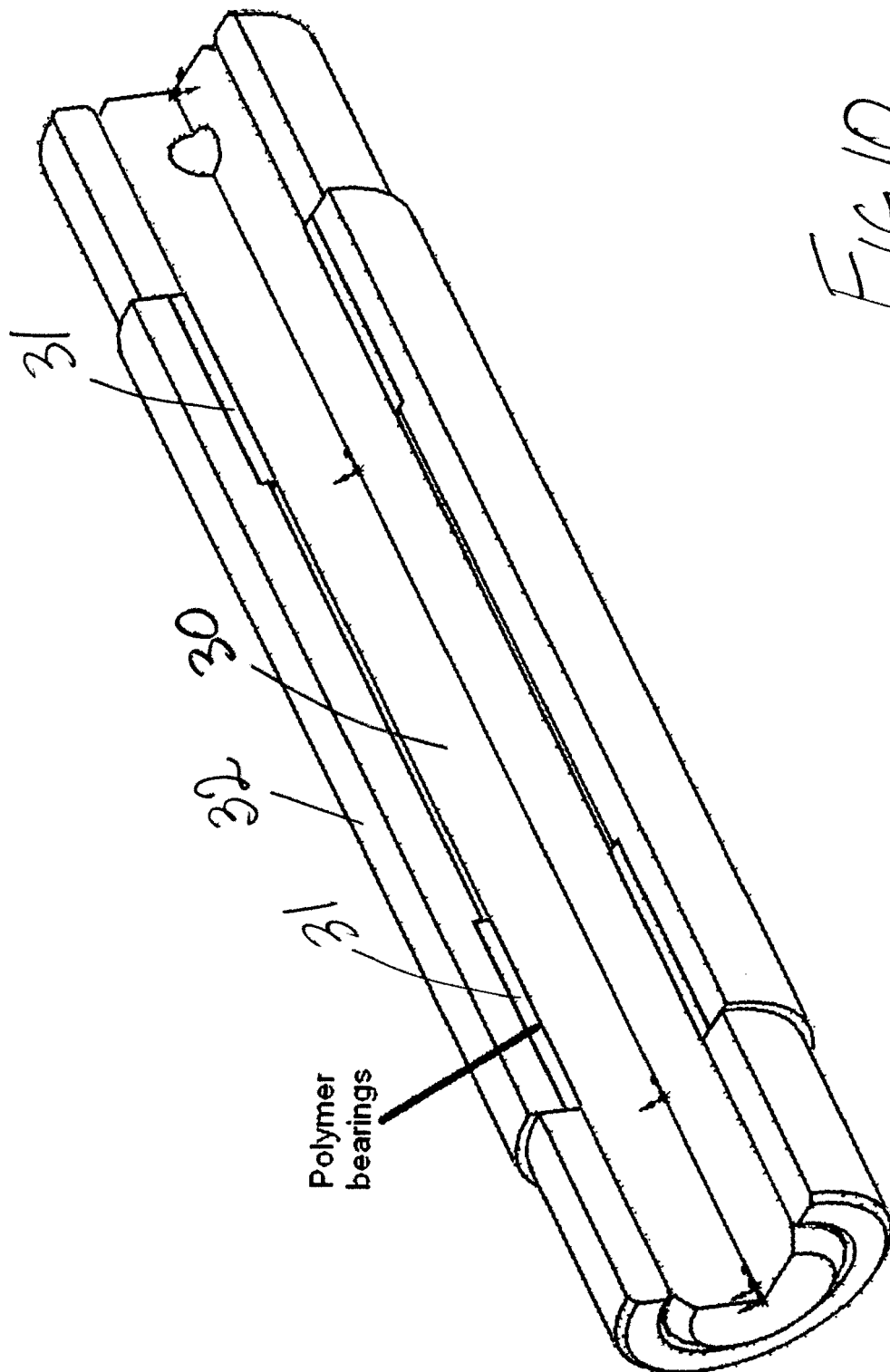


FIG 10

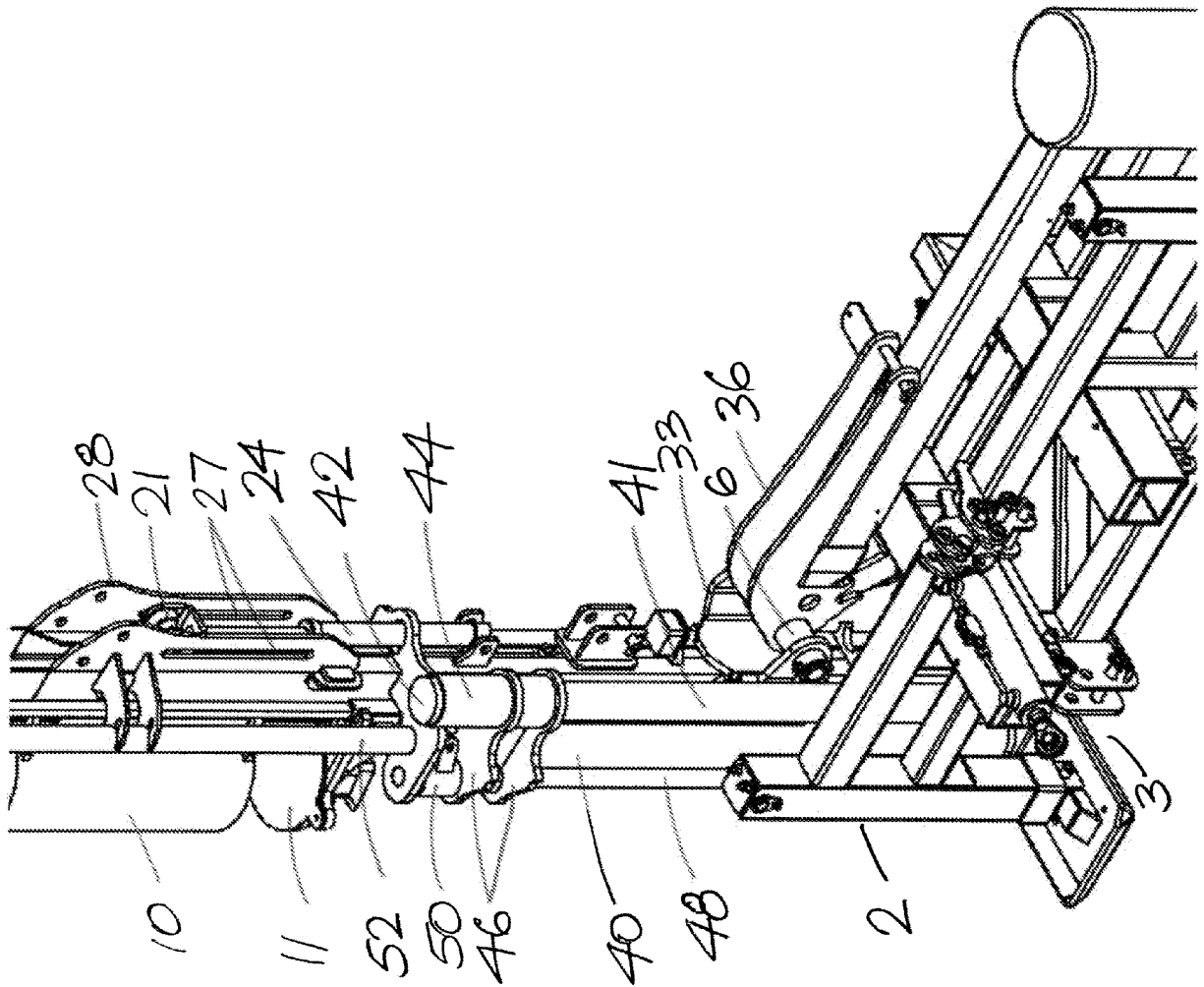
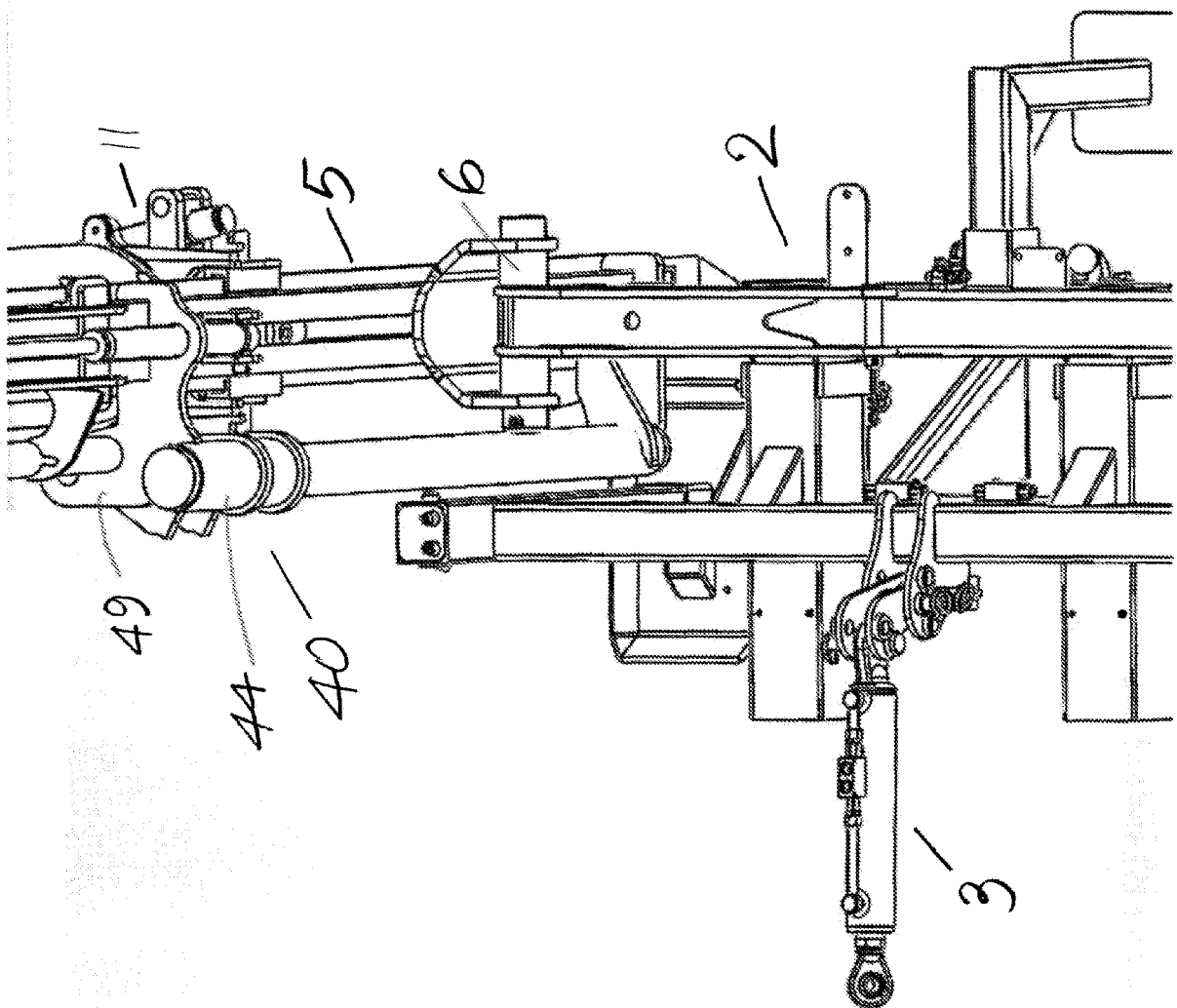
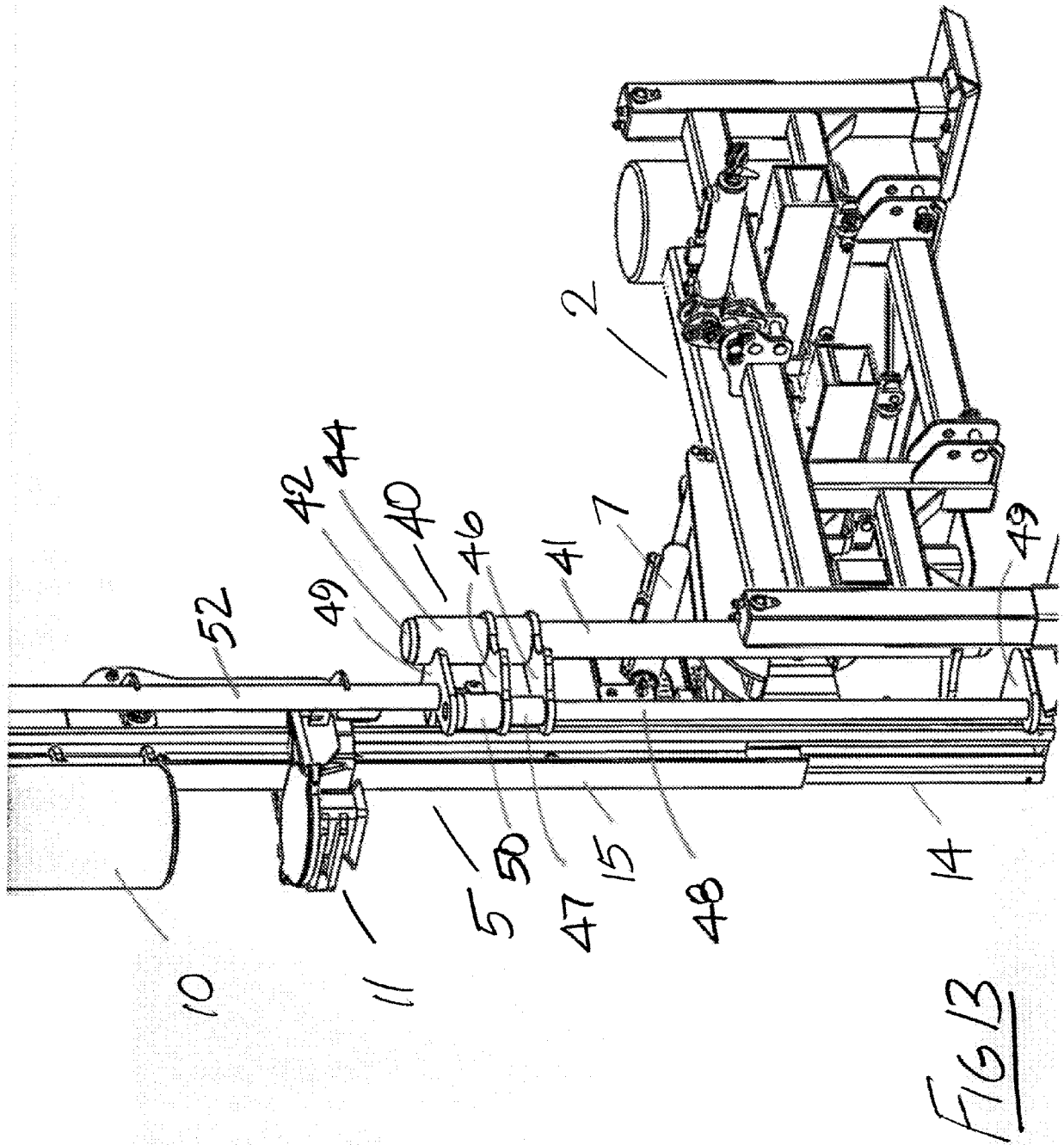


FIG 11





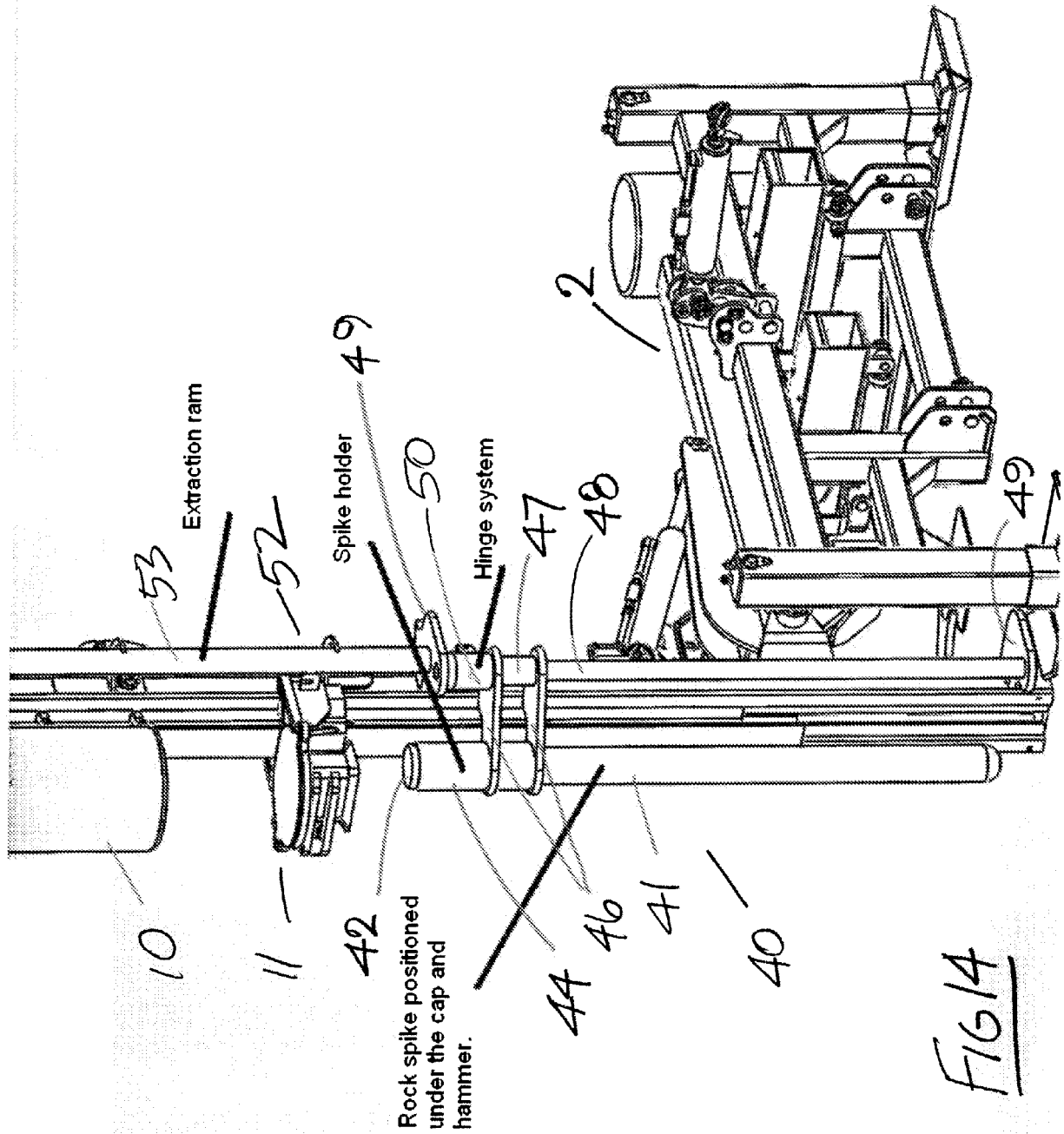
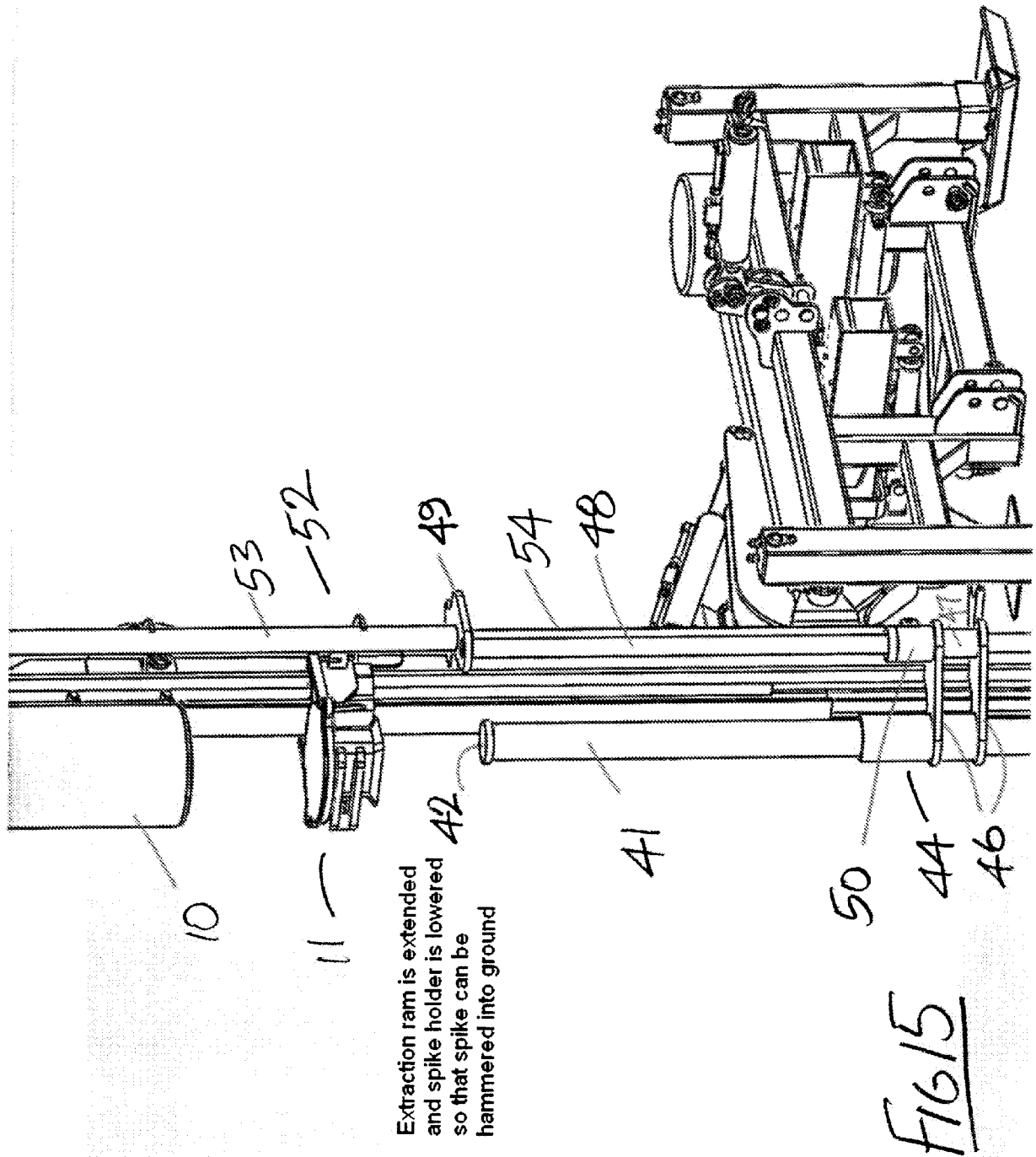
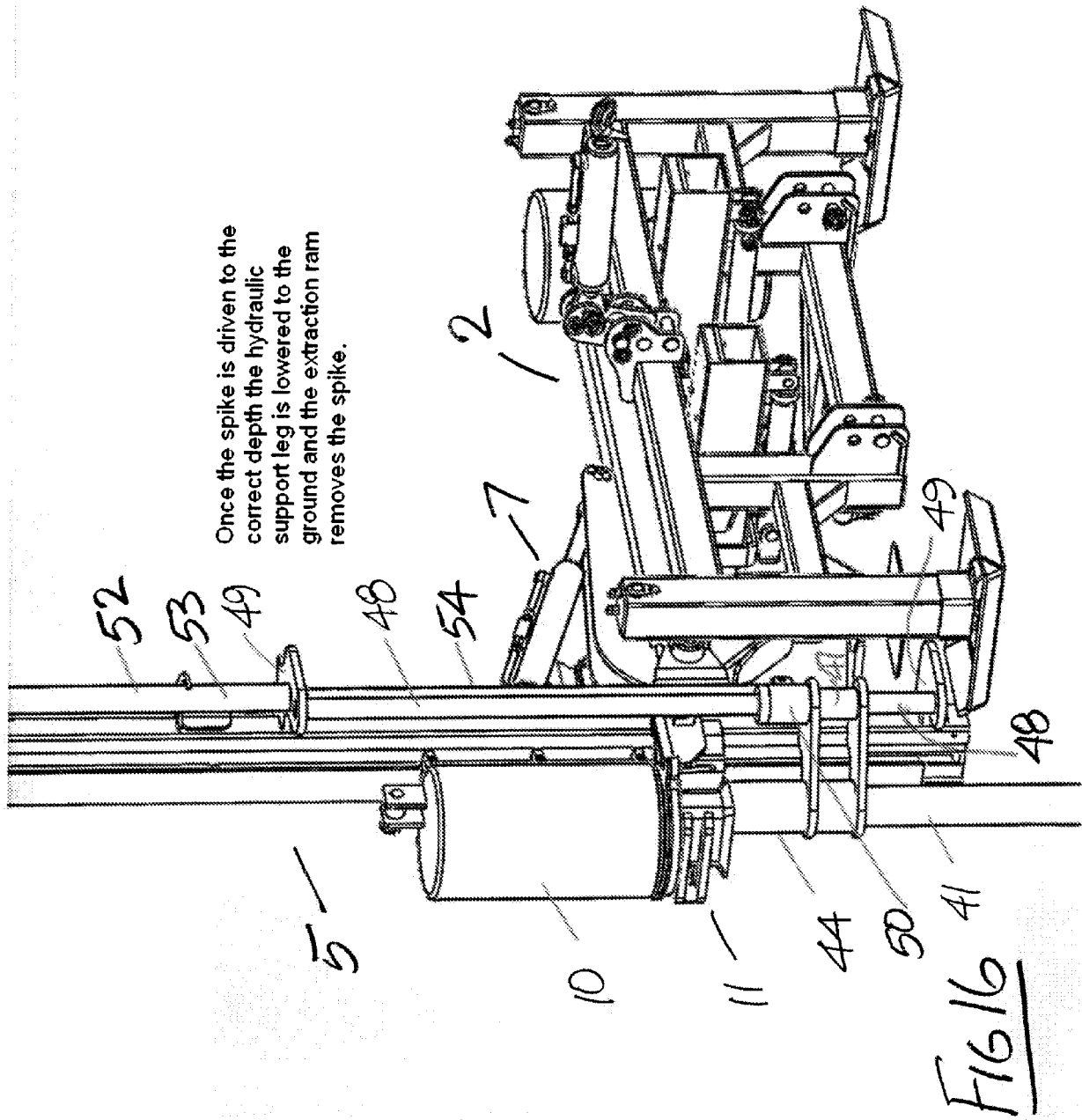


FIG 14





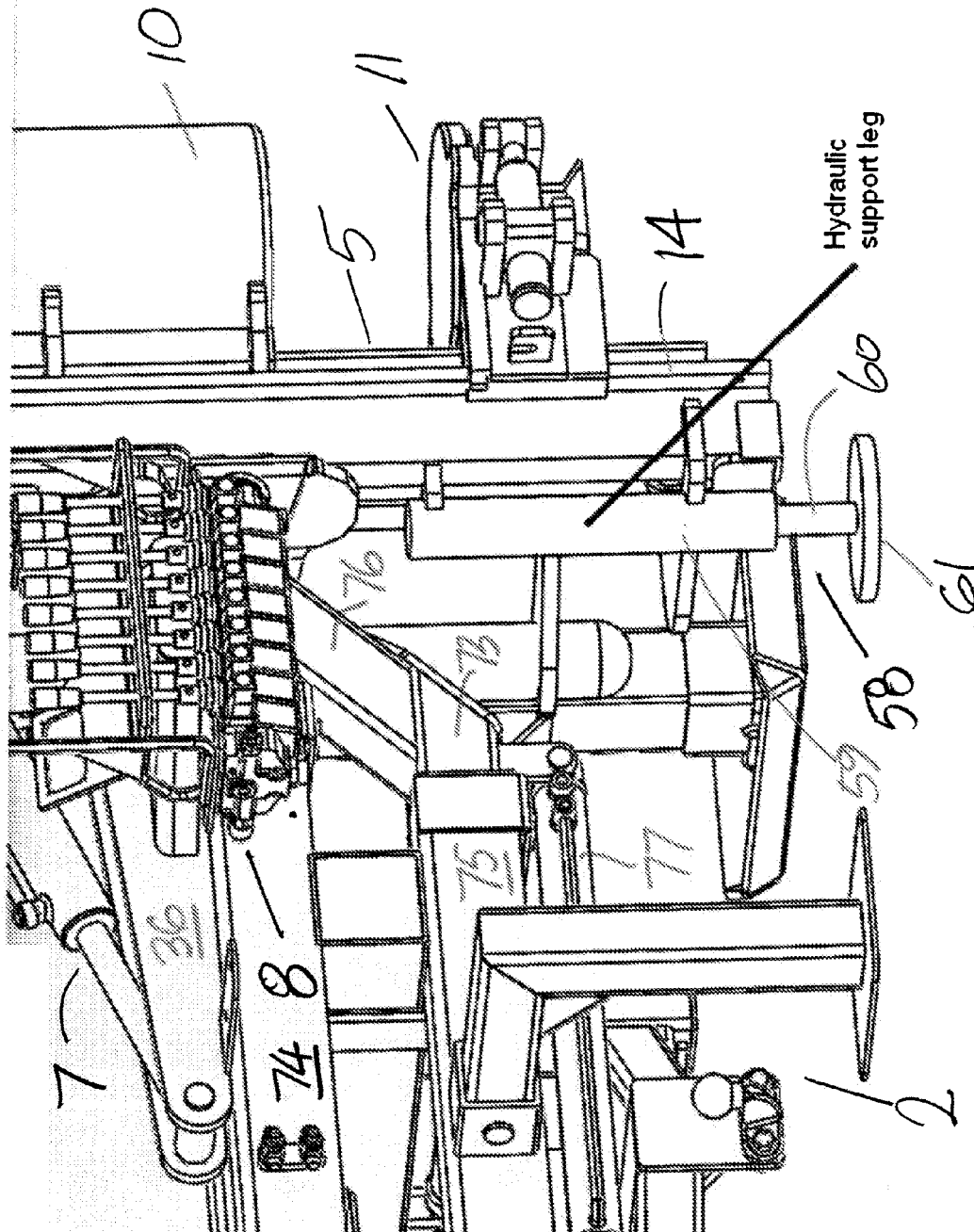


FIG 17

REFERENCES CITED IN THE DESCRIPTION

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Patent documents cited in the description

- EP 1887167 A [0002] [0019]