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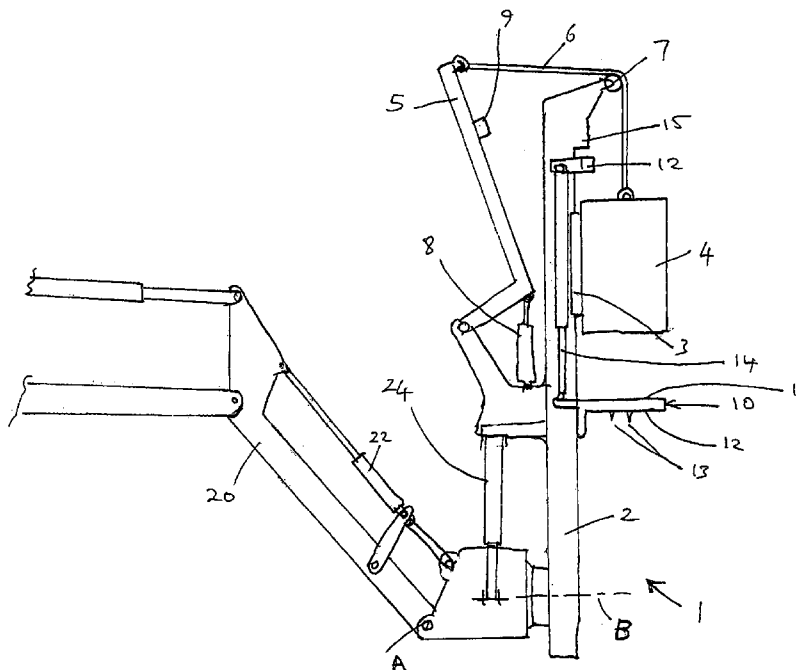
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(54) Title: POST DRIVING APPARATUS



(57) Abstract: A post driving apparatus comprising a vertical or substantially vertical mast having a driving weight slidably mounted thereon, lifting means for lifting the driving weight along the mast to a raised position, a post support slidably mounted upon the mast beneath the driving weight, the post support extending substantially perpendicular to the mast to rest upon an upper end of a post, a slide member being slidably mounted on the mast above the driving weight, said slide member being connected to the post support by an elongate linking means such that the post support can be suspended from the slide member.



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Post Driving Apparatus

This invention relates to a post driving apparatus and in particular to an apparatus for driving fence posts into the ground.

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Known post drivers comprise a vertical mast having a driving weight suspended from or slidably mounted on the mast and a lifting means, such as a hoist or a hydraulic ram, for lifting the weight and subsequently dropping the weight under the action of gravity to impact upon the upper end of post to drive the post into the ground.

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In order to hold the upper end of the post in place and to prevent damage to the end of the post from the impact of the weight, it is known to provide a post support, slidably mounted upon the mast beneath the driving weight, in the form of a flat plate having a depending post holding means, such as a spike. The post support holds the post in place and transfers the
15 impact of the driving weight on the upper face of the post support to the upper end of the post.

In order to "load" a post into the apparatus, it is necessary to hold the post support in a raised position to allow a post to be positioned beneath the post support before lowering the post
20 support into contact with the upper end of the post. This is typically achieved by providing a chain extending from the post support to be attachable to the driving weight, such that, when the driving weight is lifted by the lifting means into its raised position, the post support is also held up by the driving weight. A problem with this arrangement is that the post support must be manually released from the driving weight and there is a risk that the
25 post support may be accidentally released, potentially resulting in the trapping of an operators body between the post support and the post, potentially resulting in serious injury or death.

According to the present invention there is provided a post driving apparatus comprising a
30 vertical or substantially vertical mast having a driving weight slidably mounted thereon, lifting means for lifting the driving weight along the mast to a raised position, a post support slidably mounted upon the mast beneath the driving weight, the post support extending substantially perpendicular to the mast to rest upon an upper end of a post, a slide member being slidably mounted on the mast above the driving weight, said slide member being

connected to the post support by an elongate linking means such that the post support can be suspended from the slide member.

By means of such arrangement, the support plate can be reliably held in a raised position
5 when the driving weight is moved to its raised position by virtue of the slide member which is located above the driving weight and thereby suspends the post support beneath the driving weight by means of the elongate linking means.

Preferably said post support comprises at least one post engaging member depending
10 therefrom for engaging and holding the upper end of a post. In one embodiment, said at least one post engaging member comprises one or more depending spikes or projections adapted to be pushed into the upper surface of the post. Alternatively, said at least one post engaging member may comprise one or more depending walls arranged to be positioned around the upper end of the post to engage the sides of the post to maintain the upper end of
15 the post in position.

Preferably said elongate linking means comprises a variable length member for varying the position of the post support on the mast with respect to the slide member.

20 Preferably the elongate linking means comprises a rigid member, more preferably an extendable rigid member. More preferably the linking means comprises an extendable and retractable rigid member. In a preferred embodiment said linking means comprises a double acting hydraulic or pneumatic ram or any other kind of double acting linear actuator. In an alternative member said linking means comprises a threaded rod, such as a rigging screw, or
25 an elongate resilient member, comprising or incorporating a spring.

Preferably said mast includes an upper stop for limiting the upper position of the slide member on the mast.

30 Preferably the elongate linking means comprising a rigid link connected between the slide member and the post support for transferring a force between the upper stop and the plate support via the slide member when the slide member is in contact with upper stop.

Preferably the elongate linking means is extendable to apply a downward force upon the

post to thereby apply a preload force to an upper end of a post when the slide member is in contact with the upper stop.

Alternatively, the elongate linking means may comprise a rope, chain or similar non-rigid
5 elongate linkage extending between the post support and the slide member for suspending the post support from the slide member.

The apparatus may be adapted to be attached to an articulated arm of an excavator or back hoe. Alternatively the apparatus may be adapted to be attached to the three point linkage of a
10 tractor or similar agricultural vehicle.

An embodiment of the present invention will now be described, by way of example only, with reference to the accompanying drawings, in which:-

15 Fig. 1 is a side view of a post driving apparatus according to an embodiment of the present invention.

As illustrated in the drawing, a post driving apparatus 1 according to an embodiment of the present invention comprises an upright mast 2 having a carriage 3 slidably mounted on a
20 front face thereof, upon which carriage 3 is carried a driving weight 4 for driving a post into the ground.

A lever arm 5 is pivotally mounted on a rear face of the mast and a rope 6 is attached between the driving weight 4 and an upper end of the lever arm 5, the rope 6 extending over
25 a pulley 7 mounted at the top of the mast 2. A hydraulic ram 8 is provided for pivoting the lever arm 5 away from the mast 2 to lift the driving weight 4 to a raised position. The ram 8 is single acting to lift the driving weight 4 and then release the driving weight, allowing the lever arm 5 to freely move back into contact with the mast 2, releasing the driving weight 4 to fall under the action of gravity. A resilient stop 9 is provided on the lever arm 5 for
30 absorbing the impact of the lever arm 5 with the mast 2.

A post support 10 is slidably mounted on the mast 2 below the driving weight 4, the post support 10 comprising a flat plate extending perpendicular to the mast having an upper face
11 against which the driving weight acts and a lower face 12 provided with a plurality of

downwardly facing spikes 13 for holding an upper end of a post in contact with the post support parallel 10 to the mast 2. Alternatively, the post support may comprise a gripper plate or grab mechanism with means for positively gripping or holding the top of a post, or a peripheral depending wall arranged to surround the end of the post to retain the post in
5 contact with the post support

A slide member 12 is slidably mounted on the mast 2 above the driving weight 4 and a double acting ram 14 is connected to and extends between the slide member 12 and the post support 10 on one side of the mast 2.

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An upper stop 15 is provided at the top of the mast for limiting the upward travel of the driving weight 4 and the slide member 12, the slide member 12 being located on the mast 2 between the driving weight 4 and the stop member 15 so that the slide member 12 is trapped between the driving weight 4 and the upper stop 15 when the driving weight 4 is in its raised
15 position. When the driving weight 4 is held in its raised position, the slide member 12 is held against the upper stop 15 by the driving weight 4 and the post support 10 is held in a raised position due to the post support 10 being suspended below the slide member 12 by the double acting ram 14. Thus, the post support 10 can be reliably held in a raised position by means of the driving weight 4 and the slide member 12 to permit the safe location of a post
20 therebeneath.

Once a post has been positioned beneath the post support, the double acting ram 14 can be extended to lower the post support 10 into contact with the upper end of the post. Subsequently further extension of the double acting ram 14 pushes downwardly on the post,
25 the upper end of the double acting ram 14 acting against the upper stop 15 of the mast via the slide member 12. By means of such arrangement, the weight of the post driving apparatus 1 and, if desired, the weight of the attached vehicle, can be transferred onto the post to effectively pre-load the post and assist in pushing the post into the ground while holding the post support in contact with an upper end of the post. The driving weight 4 can
30 then be raised and release a desired number of times by activation and release of the hydraulic ram 8 to drive the post into the ground. Because the post support is connected to the slide member, which is slidably mounted on the mast above the driving weight 4, and is therefore not connected directly to the mast, the post support is free to move downwardly

with respect to the mast and the downward impact of the driving weight on the post support cannot be transmitted to the mast.

In the embodiment show, the post driving apparatus 1 is adapted to be connected to an articulated arm 20 of a vehicle, such as an excavator or back hoe. The mast is connected to the articulated arm via a rotary wrist joint and a pivot providing rotational axes in respective perpendicular horizontal axes A,B, a pair of double acting rams 22,24 being provided for respectively rotating the mast 1 about said respective axes for adjusting the angle of inclination of the mast 2 of the post driving apparatus 1. Alternatively it is envisaged that the post driving apparatus may be adapted for attachment to the three point linkage of a tractor or may be provided on a free standing framework.

The invention is not limited to the embodiment described herein but can be amended or modified without departing from the scope of the present invention. For example, in an alternative embodiment it is envisaged that the post support may be connected to the slide member by a rope or chain such that the post support is suspended from the slide member when the slide member is in its raised position. Alternatively the post support may be connected to the slide member by a threaded rod, such as a rigging screw. In a further alternative, the post support may be connected to the slide member by an elongate resilient member, comprising or incorporating a spring.

While the present invention is described in relation to a post driving apparatus wherein the driving weight fall under gravity to impact upon the end of a post, in an alternative embodiment it is envisaged that the driving weight may be movable both upwardly and downwardly along the mast by means of an actuator, such as a double acting hydraulic or pneumatic ram.

While the present invention has been described in relation to a driving apparatus for driving fence posts into the ground, it is envisaged that the present invention would be equally suitable for driving other elongate members, such as piles, poles or any other elongate members that are required to be driven into the ground.

Claims

1. A post driving apparatus comprising a vertical or substantially vertical mast having a driving weight slidably mounted thereon, lifting means for lifting the driving weight along the mast to a raised position, a post support slidably mounted upon the mast beneath the driving weight, the post support extending substantially perpendicular to the mast to rest upon an upper end of a post, a slide member being slidably mounted on the mast above the driving weight, said slide member being connected to the post support by an elongate linking means such that the post support can be suspended from the slide member.
2. An apparatus as claimed in claim 1, wherein said post support comprises at least one post engaging member depending therefrom for engaging and holding the upper end of a post.
3. An apparatus as claimed in claim 2, wherein said at least one post engaging member comprises one or more depending spikes or projections adapted to be pushed into the upper surface of the post.
4. An apparatus as claimed in claim 2, wherein said at least one post engaging member comprises one or more depending walls arranged to be positioned around the upper end of the post to engage the sides of the post to maintain the upper end of the post in position.
5. An apparatus as claimed in any preceding claim, wherein said elongate linking means comprises a variable length member for varying the position of the post support on the mast with respect to the slide member.
6. An apparatus as claimed in any preceding claim, wherein said elongate linking means comprises a rigid member.
7. An apparatus as claimed in claim 6, wherein said elongate linking means comprises an extendable and retractable rigid member.
8. An apparatus as claimed in claim 7, wherein said linking means comprises a double acting hydraulic or pneumatic ram or any other kind of double acting linear actuator.

9. An apparatus as claimed in claim 7, wherein said linking means comprises a threaded rod, such as a rigging screw, or an elongate resilient member, comprising or incorporating a spring.

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10. An apparatus a claimed in any preceding claim, wherein said mast includes an upper stop for limiting the upper position of the slide member on the mast.

11. An apparatus as claimed in claim 10, wherein the elongate linking means comprising
10 a rigid link connected between the slide member and the post support for transferring a force between the upper stop and the plate support via the slide member when the slide member is in contact with upper stop.

12. An apparatus as claimed in claim 11, wherein the elongate linking means is
15 extendable to apply a downward force upon the post to thereby apply a preload force to an upper end of a post when the slide member is in contact with the upper stop.

13. An apparatus as claimed in any of claims 1 to 5, wherein the elongate linking means comprises a rope, chain or similar non-rigid elongate linkage extending between the post
20 support and the slide member for suspending the post support from the slide member.

14. An apparatus as claimed in any preceding claim, wherein the apparatus is adapted to be attached to an articulated arm of an excavator or back hoe.

25 15. An apparatus as claimed in any of claims 1 to 13, wherein the apparatus is adapted to be attached to the three point linkage of a tractor or similar agricultural vehicle.

16. A post driving apparatus substantially as herein described with reference to the accompanying drawings.

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