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[54] ARTICULATED JIB FOR CRAWLER TRACTORS AND THE LIKE

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[51] Int. Cl. B66c 23/00

[58] Field of Search 212/3, 8 R, 8 A, 33, 46 R, 212/48 R, 49, 58 R, 59 R, 70

[56] References Cited

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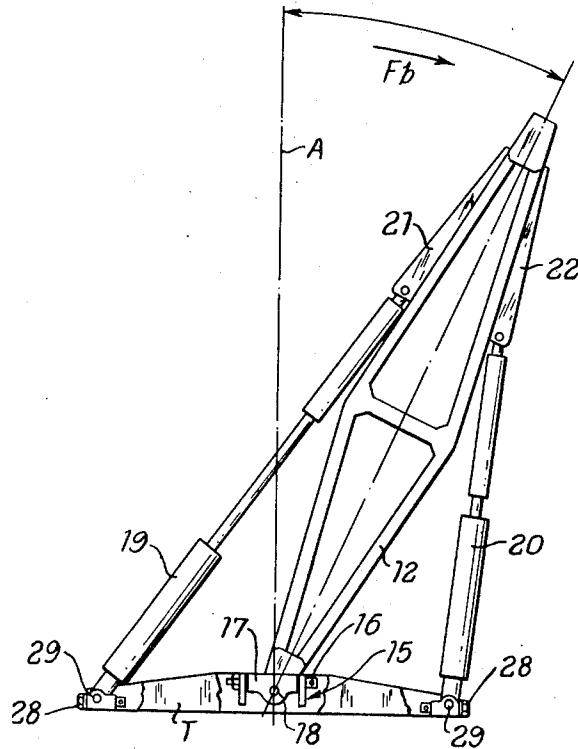
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[57]

ABSTRACT

A crawler tractor having lifting means for pipe-laying, said lifting means comprising a lifting jib articulated laterally to the tractor frame by means of a universal joint, the jib being movable under the action of a plurality of hydraulic jacks for producing the pivotal movement of the jib in a transverse vertical plane and movement in a plane parallel to the longitudinal axis of the tractor in order to displace the centre of gravity of the lifted load.

9 Claims, 3 Drawing Figures



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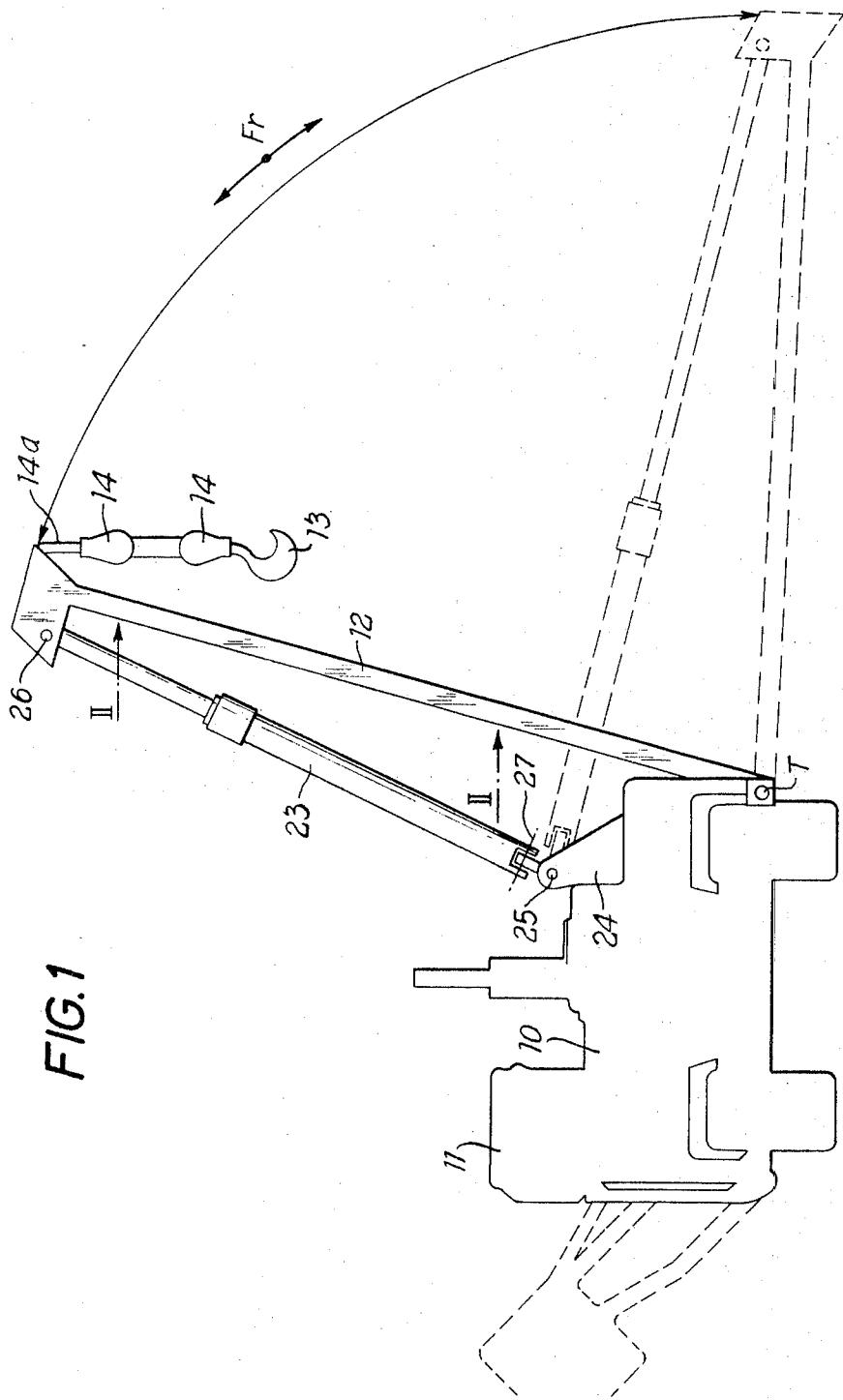


FIG. 1

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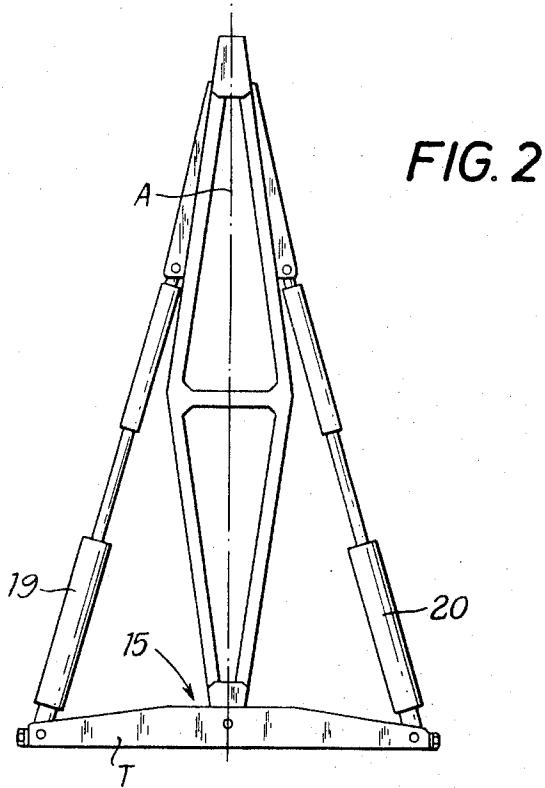


FIG. 2

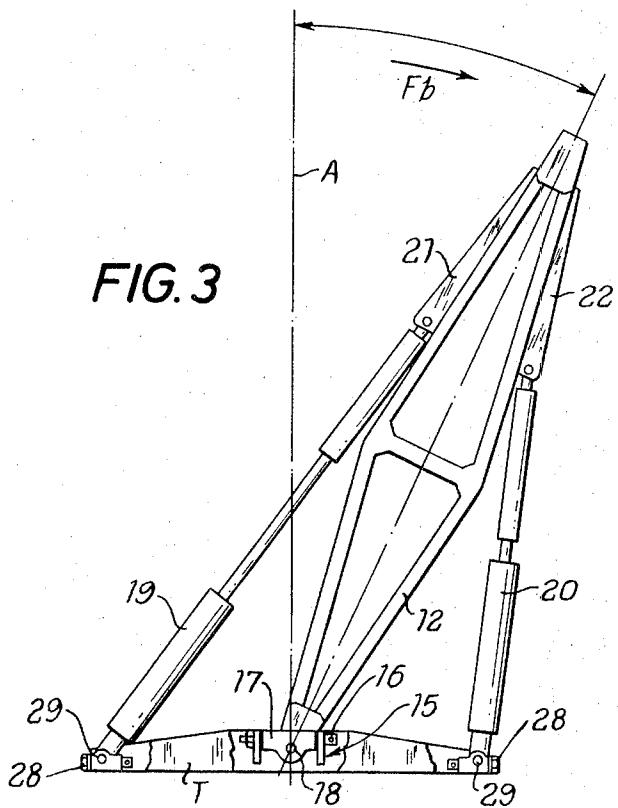


FIG. 3

ARTICULATED JIB FOR CRAWLER TRACTORS AND THE LIKE

BACKGROUND TO THE DISCLOSURE

The present invention relates to crawler tractors provided with lifting equipment in the form of a crane jib, especially for use in laying lengths of piping for oil pipelines, water pipes or the like.

PRIOR ART

It is known that the tractors of the above mentioned kind consist of tracked machines provided at one side with a lifting jib equipped with sling ropes and winch members, the jib laterally overhanging the machine to enable the machine to run along the side of the basic excavation, laying lengths of pipes one after the other. When working as aforesaid it often happens that the tractor runs on very steep inclines; accordingly the overall centre of gravity of the machine and lifted load, for instance of a length of pipe, moves beyond the limit of the ground-contacting track of the machine, so that the tractor shows a tendency to turn over.

In order to obviate this disadvantage it has already been proposed to employ a stabilizer consisting of a track shoe capable of being rapidly extracted and put into contact with the ground.

OBJECT OF THE INVENTION

It is an object of this invention to provide alternative means to move the balance of the machine.

BRIEF SUMMARY OF THE INVENTION

For this purpose, according to the invention the lifting jib is made movable in a plane parallel to the direction of the longitudinal axis of the machine in response to inclination of the machine whereby to displace the lifted load in relation to the centre of gravity of the machine so that the overall centre of gravity of both lifted load and machine are constantly kept within the length of the track of the machine.

The movement of the lifting jib in the relevant plane is advantageously obtained by means of a pair of symmetrical hydraulic jacks operable in such a way that they pivot the jib about an articulation point on the machine frame. Furthermore, the jib is provided with a third jack, capable of effecting its operational tilting in the transverse vertical plane, thus eliminating the need for turnover ropes, the presence of the latter being inconsistent with the longitudinal movement of the jib, essentially for the safety of the operator.

BRIEF DESCRIPTION OF DRAWINGS

Further features and objects of the invention will be understood from the following detailed description referring to the accompanying drawings, given by way of non-limitative example, in which:

FIG. 1 is a diagrammatic front elevation of the machine, showing the lifting jib and the turnover movement thereof in the transverse vertical plane;

FIG. 2 is a view of the lifting jib in direction of arrows II-II of FIG. 1, showing the jib in the central position of normal deployment; and

FIG. 3 is a view similar to FIG. 2 but showing the jib angularly displaced in a longitudinal plane in order to produce an appropriate displacement of the centre of

the gravity of the lifted load along the longitudinal axis of the machine.

DESCRIPTION OF EMBODIMENT

5 In the drawings, 10 generally designates the machine, which consists of a crawler tractor provided with an operator's cab 11 at one side and a cantilevered lifting jib 12 at the side opposite to the operator's cab. The jib 12 is provided with a sling hook, operable through the intermediary of a reduction pulley 14 by means of a rope 14a cooperating with a winch (not illustrated).

In accordance with the invention, the lower part of the jib 12 is linked on the frame of the machine by means of a double articulated joint, as designated in a

15 general way by 15 in FIG. 3. The latter is provided with a hub 16 for articulation of the jib in the transverse vertical plane, thus making the jib capable of pivotal movement in said plane, hereafter said "turnover pivoting," in direction of the arrows *Fr* (FIG. 1). According

20 to the invention, the turnover pivoting is obtained by means of a hydraulic jack 23, linked at one side on a support 24, on the machine frame, by interposition of a pivot pin 25 and, at the opposite side, on the end of the jib 12, by interposition of a pivot pin 26. It is worth noticing that the position of the jack 23 does not interfere with the part of machine provided with the operator's cab 11, the presence of said jack being consistent with the longitudinal follower movements of the jib, as hereafter specified in detail. The support 24 is accord-

30 ingly provided with a further pivot 27, orthogonal to the above said pivot pin 25. In order to permit the follower movement, the articulation of the hub 16 is effected by interposition of a sleeve 17, provided with a pivot pin 18, around which the jib 12 is articulated in

35 such a way that it can oscillate clock- and counter-clockwise in the relevant longitudinal plane (drawing plane of FIGS. 2 and 3), symmetrically in relation to an intermediate position of normal duty as defined by an axis A, perpendicular to the longitudinal axis of the machine. The angular amplitude will be determined in relation to the duty requirements of the machine, for instance within 25° to 30°, as shown in FIG. 3, wherein the maximum amplitude of the jib is angularly clockwise displaced in direction of arrow *Fb* in relation to the axis A.

According to the invention, the follower movement is advantageously reached by means of symmetrical hydraulic jacks 19, 20 articulated at one end on respective arms 21, 22 which are carried by the jib. The articulations of the jacks on the frame I are also of the crossed pivots kind, respectively 28, 29 one being provided for the turnover pivoting, the other for the follower movement. Jacks 19, 20 are hydraulically inter-

55 connected by means of appropriate valves, so that with the expansion of one, for instance that corresponding to the jack 19 for the clockwise follower movement retraction of the other occurs. Both jacks can be single-acting or double-acting. With the above mentioned structure it is self evident that the follower movement of the jib will follow a displacement of the centre of gravity of the load, parallel to the longitudinal axis of

60 the machine and in a plane dependent on the conditions of turnover pivoting. The centre of gravity of the load is displaced towards the front or rear of the machine, thus compensating for variations in inclination of the latter during operation. Accordingly if, for instance, the jib 12, as seen from above, is in a position

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on the left side of the machine and should the machine enter an uphill gradient, the displacement of the centre of gravity of the load, consequent to the inclination of the machine, will be compensated by a corresponding clockwise training of the jib, the overall centre of gravity of the machine and the load being contained, according to the object of the invention, within the ground-contacting track of the machine. In order to ensure balance of the machine in the case of sudden variations in its inclination, jacks 19, 20 will advantageously be of the rapid expansion kind, using a pump provided with valve means as necessary to carry out an emergency fluid delivery. For normal duty a part only of the said pump delivery will suffice.

It will be appreciated that the manner of carrying out the invention can widely vary in relation to the above description and accompanying drawings, without departing from the scope of the invention as defined in the appended claims.

I claim:

1. A crawler tractor comprising:
a cantilevered lifting jib directly articulated on the tractor for pivotal movement in a vertical plane which is transverse relative to the tractor;
pivot means having a pivot axis substantially parallel to said transverse plane to support the lifting jib for pivotal movement in a longitudinal plane which is substantially parallel to the longitudinal axis of the tractor in response to the inclination of the tractor; and
jack means located in a common plane with the jib for moving the jib in said longitudinal plane, so as to displace the lifted load in relation to the centre of gravity of the tractor substantially parallel to the said longitudinal axis so that the overall centre of gravity of the lifted load and machine is retained

within the ground-contacting track of the machine.

2. A tractor according to claim 1 wherein said jib is directly articulated to the frame of the tractor.

3. A tractor according to claim 2 wherein said tractor has a laterally oriented cab thereon.

4. A tractor according to claim 3 wherein said jack means includes:

a pair of symmetrical hydraulic jacks for effecting the longitudinal displacement of the jib by pivoting the jib about the transverse axis of articulation to the tractor frame; and

an additional hydraulic jack for effecting pivotal movement of the jib in the transverse vertical plane about a pivot on the tractor on the side thereof opposite to a lateral operating cab.

5. A tractor according to claim 4 including means for effecting said transverse articulation of the lifting jib for its longitudinal movement, said means including a sleeve rotatable about a pivot pin, said sleeve carrying an orthogonal pivot pin on which the jib is mounted for its pivotal movement in the transverse vertical plane.

6. A tractor according to claim 5 wherein said jacks are mounted between the tractor and the jib by means of universal joints formed by crossed pivots.

7. A tractor according to claim 4 wherein said jacks are mounted between the tractor and the jib by means of universal joints formed by crossed pivots.

8. A tractor according to claim 4 wherein said pair of hydraulic jacks are connected between the tractor and the jib.

9. A tractor according to claim 8 wherein said jib and said pair of jacks are located in the same common plane, said jacks being located on opposite sides of said jib.

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