March 31, 1931. K. BERGER 1,798,397

SPAR SUPPORTING MEANS FOR USE ON HOISTING AND HAULING MACHINES

Filed July 23, 1929 3 Sheets-Sheet 1

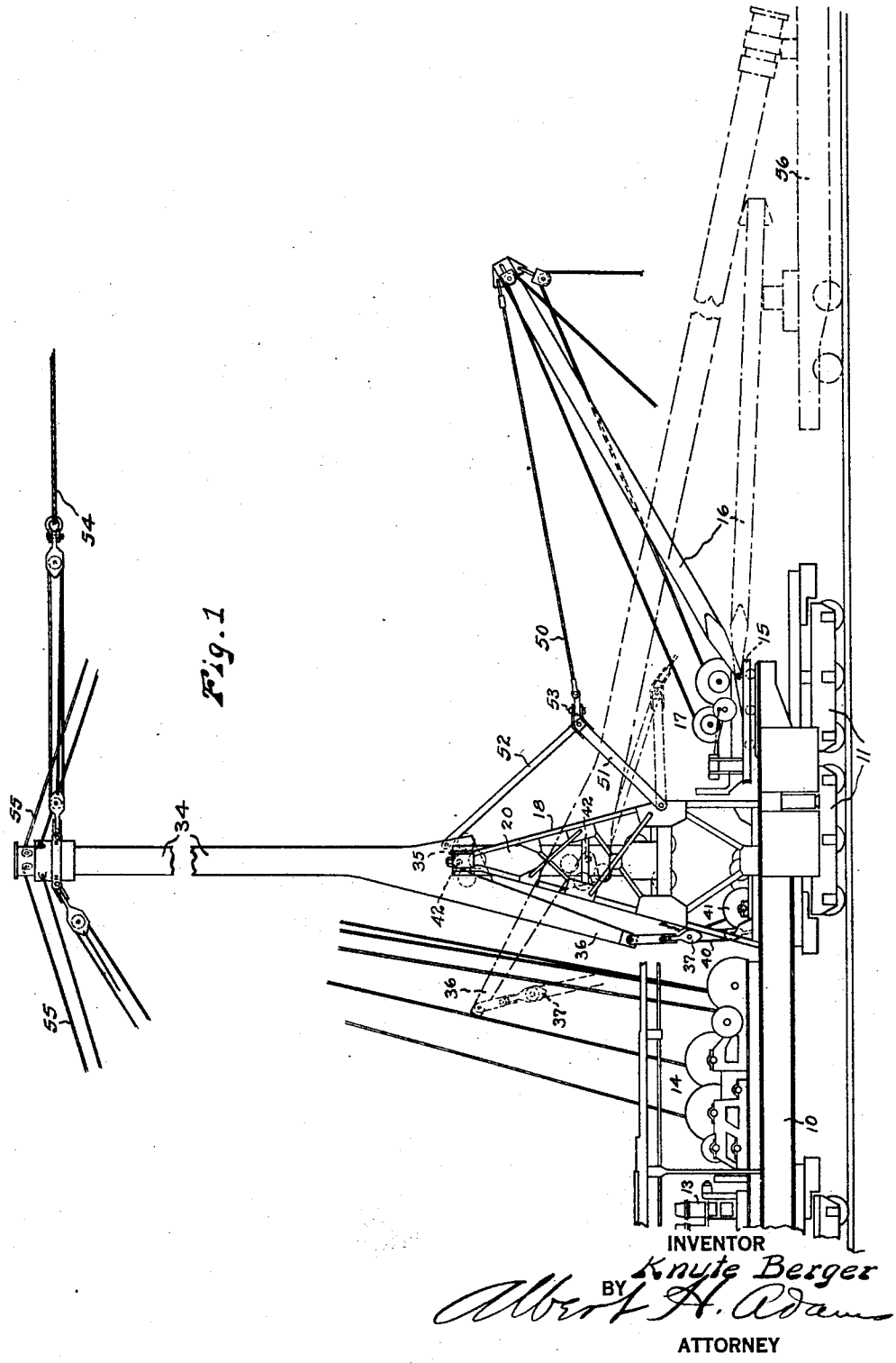


Fig. 1

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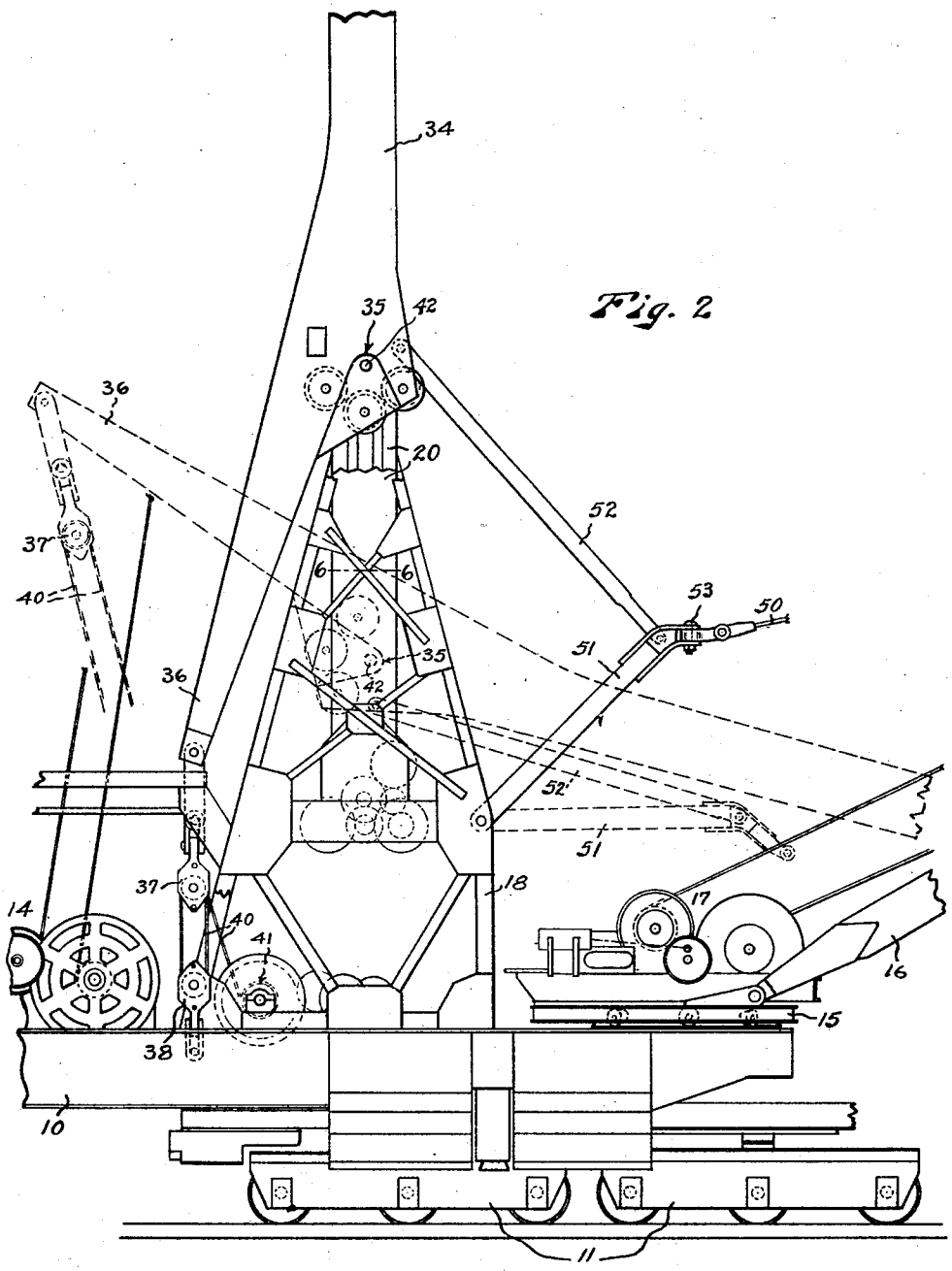


Fig. 2

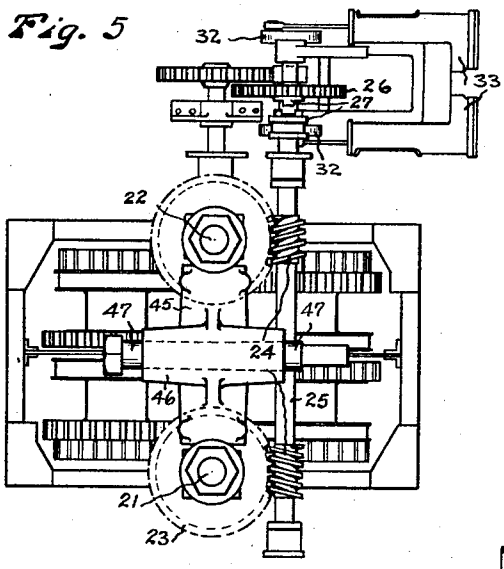
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Fig. 5



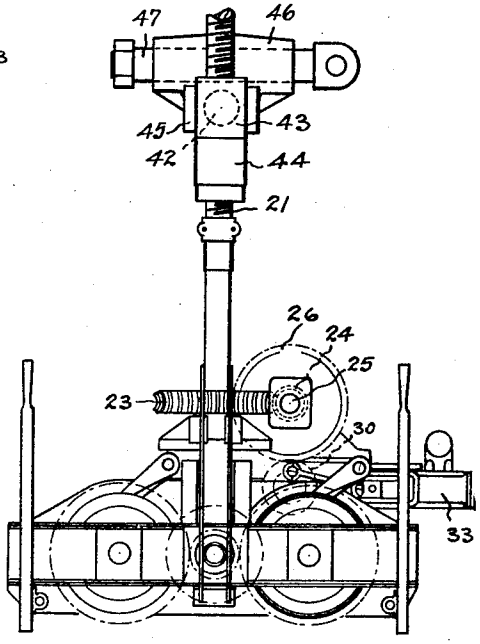


Fig. 3

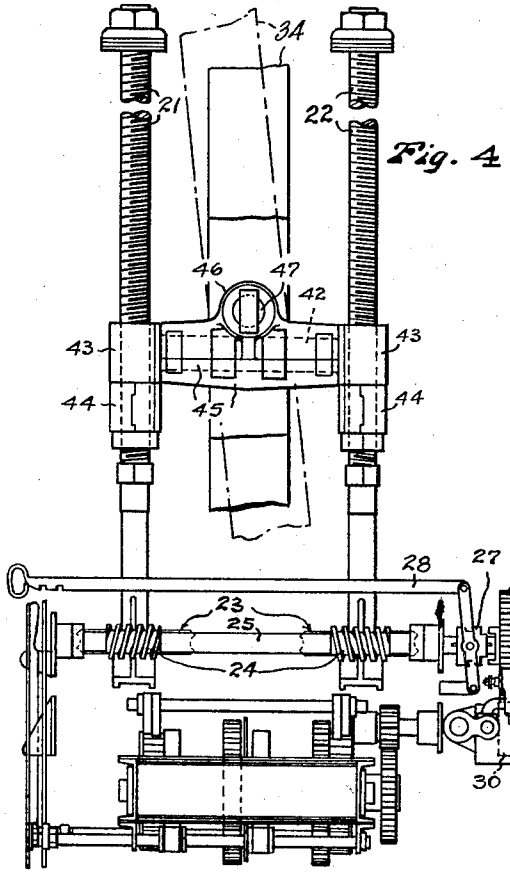


Fig. 4

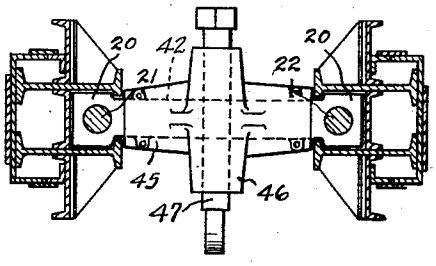


Fig. 6

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UNITED STATES PATENT OFFICE

KNUTE BERGER, OF SEATTLE, WASHINGTON

SPAR-SUPPORTING MEANS FOR USE ON HOISTING AND HAULING MACHINES

Application filed July 23, 1929. Serial No. 380,331.

My invention relates to improvements in spar supporting means for use on hoisting and hauling machines of the form commonly known as "tower skidders" and the object of my invention is to provide vertically adjustable means for supporting the trunnion pin upon which the main spar of a tower skidder is pivotally mounted for swinging movement, whereby the over-all height of this part of the machine may be reduced and the center of gravity lowered when the spar is in the lowered position and whereby the effective leverage through which forces, tending to tilt the frame of the machine, are exerted by the spar on said frame when the spar is in lowered position while going around a curved track.

Other and more specific objects reside in the details of construction by which the lowering and raising of the trunnion pin of the main spar of a tower skidder is accomplished.

A tower skidder of the form used in logging operations embodies a frame arranged to be supported above a railroad track so that logging cars may pass thereunder. Mounted upon this frame, which is often sixty feet or more in length, are all of the engines, drums, spars, booms and like mechanism which may be necessary for hauling in, hoisting and loading the heaviest logs, said mechanism including the main spar, which is usually from ninety to one hundred feet long and is pivoted for swinging movement. This main spar, when elevated, is supported by guy lines but when the machine is to be moved said main spar must be lowered and the free end of said main spar must be supported on a separate flat car, the machine proper being supported on railway trucks when it is to be moved. Obviously the main spar must be large and heavy and said main spar will have a tendency to tilt the machine sidewise even when it is lowered.

This tendency will be very much greater when the machine is being moved around curves with the free end of the main spar resting on a separate flat car, in which instance sufficient thrust or pull may be exerted through the spar to tip the machine over. In accordance with my present invention I lower the trunnion pin which forms the pivotal support for the lower end of the main spar thus lowering the center of gravity and shortening the lever arm through which thrusts and pulls on the main spar are exerted on the main frame of the machine.

The above and other objects will be apparent from the following description taken in connection with the accompanying drawings.

In the drawings, Figure 1 is an elevation on a reduced scale with parts broken away of apparatus constructed in accordance with my invention, showing by full lines the main spar in a raised position and by dotted lines the main spar in a lowered position.

Fig. 2 is a fragmentary elevation on a larger scale of the same.

Figs. 3 and 4 and 5 are detached fragmentary views on a still larger scale showing, respectively, a side elevation, a front elevation, and a plan of the main spar trunnion and the mechanism for raising, lowering, guiding and supporting the same.

Fig. 6 is a cross section on broken line 6—6 of Fig. 2 with the trunnion means in lowered position and the spar removed.

Referring to the drawings, throughout which like reference numerals designate like parts, 10 is the main horizontal frame of a tower skidder and 11 are railroad trucks upon which the tower skidder is supported for movement on a railroad track. When the tower skidder is used for hauling and loading purposes the railway trucks are removed and the skidder is supported directly above the railroad track by suitable supporting means, not shown, which is positioned on each side of the track so that the empty cars may pass freely under the skidder.

Toward the rear end of the skidder are engines 13 which drive suitable winding drums, designated generally at 14, while toward the forward end of the skidder is a turntable 15 upon which is mounted a boom 16 together with suitable motor and winding mechanism 17 for operating the hoisting lines which are associated with the boom.

Rigidly secured to the main skidder frame 10 between the drums 14 and the turn table 15 is an upright tower 18 which is of substan-

tially the shape of a letter "A" as seen from either side and which is preferably built up of suitable channels and angles and plates and is diagonally braced substantially as shown. Formed within the tower 18 are two spaced apart parallel upright guideways 20 within which two vertical screws 21 and 22 are operatively disposed. Toward their lower unthreaded ends the screws 21 and 22 are respectively provided each with a worm wheel 23 which meshes with a suitable worm 24 on a transverse shaft 25. One of the worms 24 is preferably made right hand and the other worm is made left hand, as shown in Figs. 4 and 5, to counterbalance each other and do away with the necessity of providing thrust bearings for the shaft 25. The shaft 25 has a gearwheel 26 rotatably mounted on one end thereof and arranged to be engaged by a clutch 27 which is splined on the shaft 25. A hand lever 28 is provided for operating the clutch 27. The gear wheel 26 meshes with a gearwheel 30 on another shaft which is provided with crank discs 32 and is arranged to be driven by a suitable engine or motor 33. The motor 33 may operate without driving the screws 21 and 22 so long as the clutch 27 is disengaged but when said clutch is engaged the screws will be driven by the motor, the gear ratio being greatly reduced. The motor 33 is preferably reversible so that the screws may be driven in either direction.

The screws 21 and 22 serve to adjustably support the trunnion mechanism on which the main spar 34 of the skidder is mounted. This main spar 34 is a relatively long member, usually built up of steel sections and weighing many tons, and said main spar is forked as at 35 at the location of the trunnion and is provided with an inclined lever portion 36 which extends beyond the location of the fork and to which is connected suitable raising and lowering means, which, in the construction shown, comprises two sheaves 37 and 38 and a cable 40, said cable being wound on drum 41. By winding in on the cable 40 a pull is exerted on the lever portion 36 for raising the main spar into an upright position and by paying out said cable the main spar may be lowered.

The trunnion mechanism comprises a yoke 42 having a cylindrical central portion and having a tubular guide portion 43 at each end which is adapted to fit slidably over one of the screws 21 and 22, the bottoms of said tubular guide portions 43 being connected with or resting upon nuts 44 which are threaded onto the screws 21 and 22 so that when the screws are rotated the yoke will be raised and lowered. The yoke 42 has a two part sleeve 45 mounted on the cylindrical portion thereof so that it is free to oscillate and said sleeve 45 has a tubular extension 46 on its top side extending at right angles to the sleeve. A bolt 47 passes through the extension 46 and is secured to the main spar 34 thus securing said main spar to the trunnion and yet leaving said main spar free to rock sidewise. Lowering and raising of the main spar is permitted by the turning of the two part sleeve 45 on the trunnion yoke 42. The ends 43 of the trunnion yoke are guided for vertical movement in the guideways 20 within which the screws are disposed.

For the purpose of supporting the boom 16 and permitting said boom to be lowered when the main spar 34 is folded, I provide a guy cable 50 having one end connected with the outer end of the boom and the other end connected with two relatively folding frame members 51 and 52. The upper end of the frame member 52 is pivotally connected with the lower end of the main spar 34, the lower end of the frame member 51 is pivotally connected with the frame 18 and the other two ends of the frame members 51 and 52 are pivotally connected with each other so that said two frame members will fold together in jack knife form when the main spar is lowered and turned down into a horizontal position. The connection of the cable 50 with the two frame members 51 and 52 includes a vertical pivot 53 which is directly above the center of the turntable 15 when the main spar and boom are elevated and which permits sidewise swinging movement of the boom.

The main spar 34 may be used for supporting one end of a sky line or main track cable 54, the top end of said spar necessarily being supported by suitable guy lines 55 when the spar is in the raised position. When the spar is lowered the end of the same may be supported on a separate flat car 56.

In the operation of this invention when the skidder is in use the main spar is supported in an upright position as shown by full lines in Figs. 1 and 2 with the trunnion 42 on which it is pivoted elevated to its maximum height. When the machine is to be moved the main spar is first lowered so that the outer end of the same rests on the flat car 56 and the base end of said main spar is then lowered by driving the screws 21 and 22 and lowering the trunnion 42. This lowers the center of gravity of the base end of the spar and lowers the lever portion 36 enough so that it does not extend above the top of the frame 18.

Lowering the point of support or trunnion 42 of the base end of the spar 34 also lowers the point at which any thrust or pull on the main spar will be applied to the frame 18 and consequently greatly reduces the danger of the machine being tipped over while the same is being moved along a curved railroad track.

The foregoing description and accompanying drawings clearly disclose a preferred em-

bodiment of my invention, but it will be understood that this disclosure is merely illustrative and that such changes in the device may be made as are fairly within the scope and spirit of the following claims.

What I claim is:—

1. In a tower skidder, a horizontal main frame, an upright spar supporting frame on said main frame, vertical guides in said spar supporting frame, upright screws within said guides, trunnion means extending crosswise between said guides the ends of said trunnion means having threaded engagement with said screws whereby said trunnion means will be moved vertically by rotation of said screws, and a relatively long heavy main spar pivoted for swinging movement on said trunnion means.

2. In a tower skidder, a horizontal main frame, an upright spar supporting frame on said main frame, trunnion means guided for vertical movement in said spar supporting frame, a main spar supported on said trunnion means for swinging movement between a substantially horizontal and an upright position, a downwardly extending inclined hoisting lever on the bottom of said main spar and devices for lowering said trunnion means when said main spar is horizontal and raising said trunnion means when said main spar is to be raised into upright position.

In testimony whereof I hereunto affix my signature.

KNUTE BERGER.