Aug. 9, 1938. G. S. KELLEY 2,126,118

LOAD HANDLING MACHINE

Filed Feb. 17, 1936 3 Sheets-Sheet 1

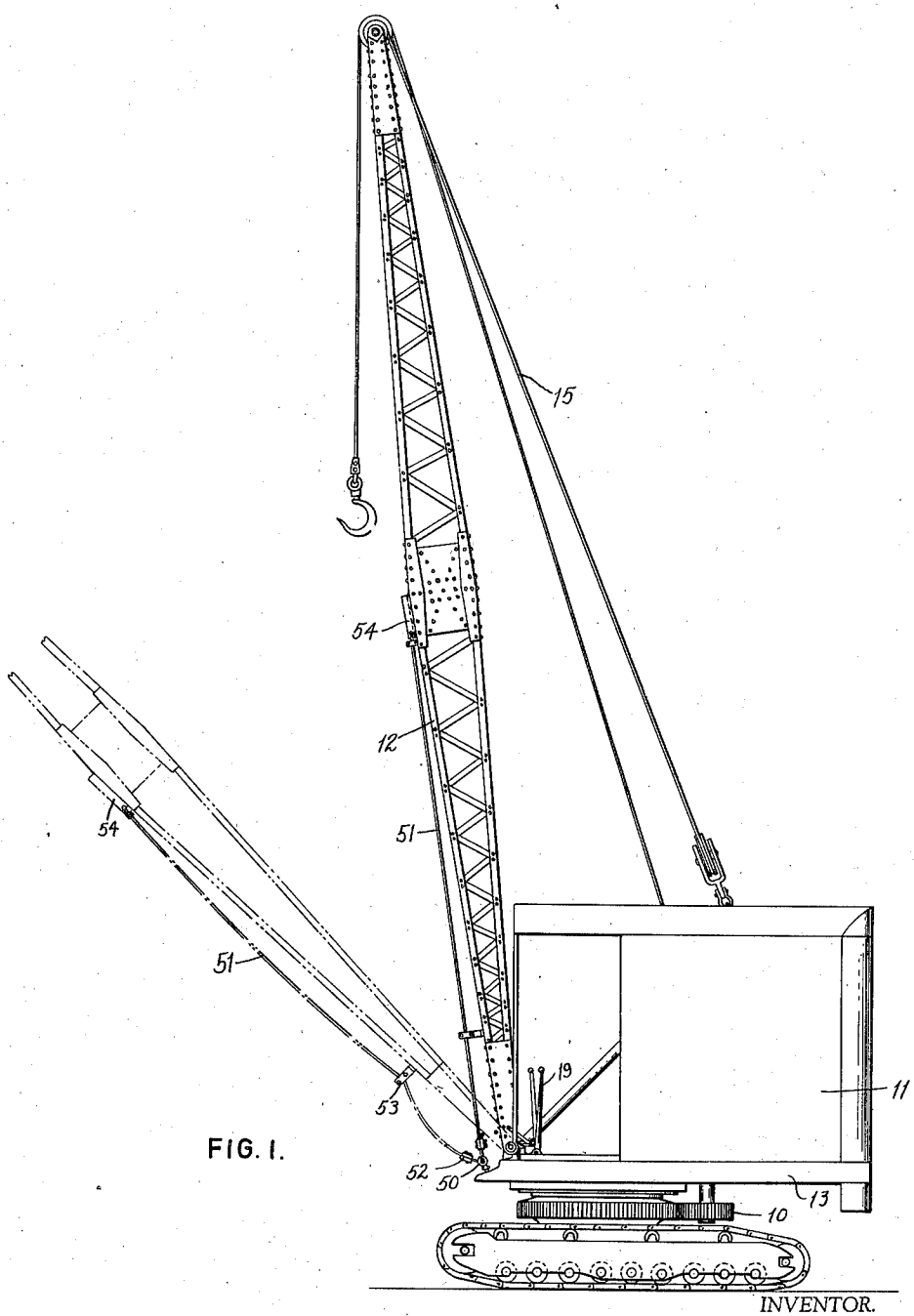


FIG. 1.

INVENTOR.

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BY Stoughton & Camfield

His ATTORNEYS.

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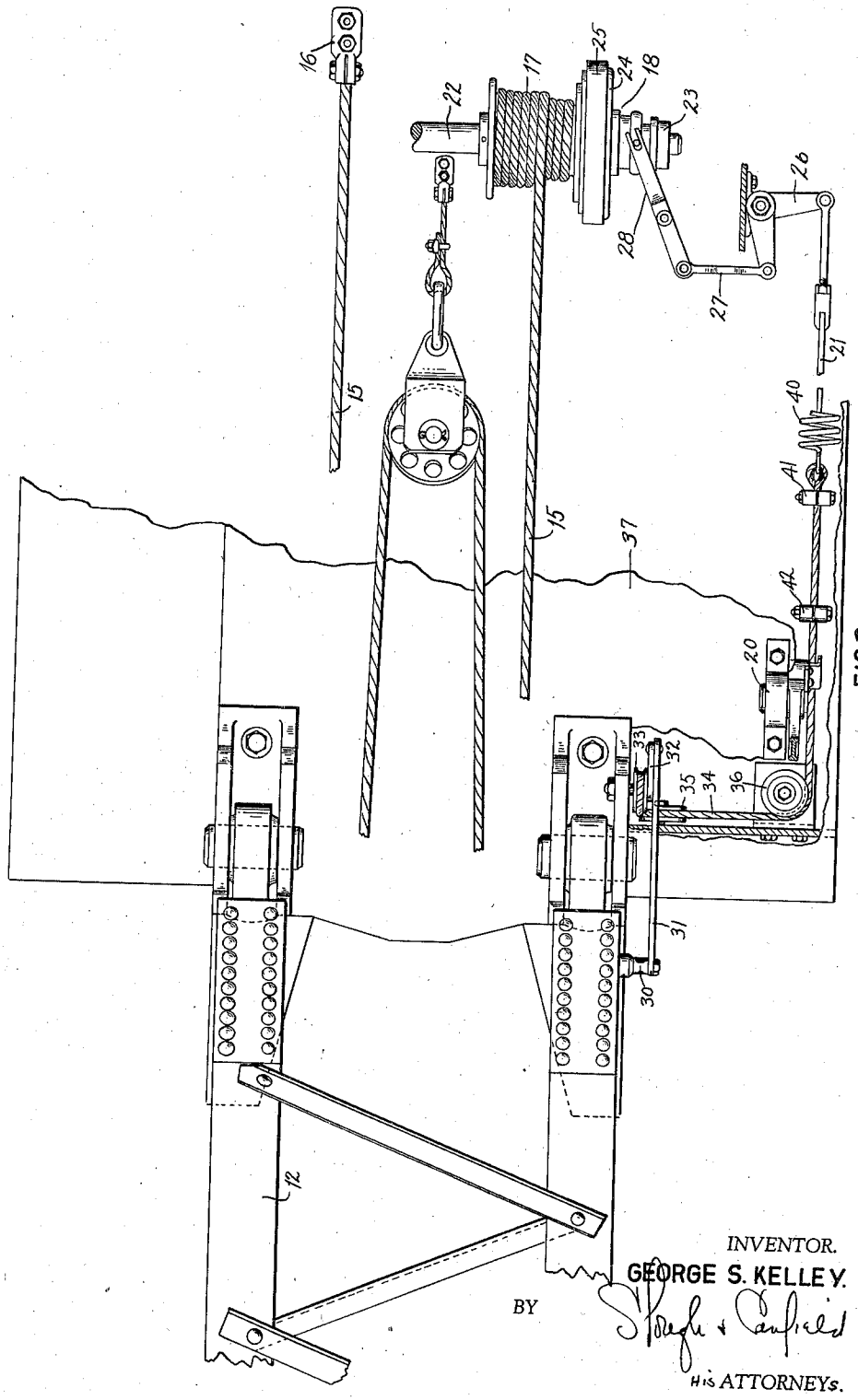


FIG. 2.

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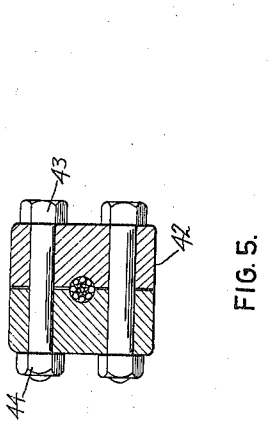


FIG. 5.

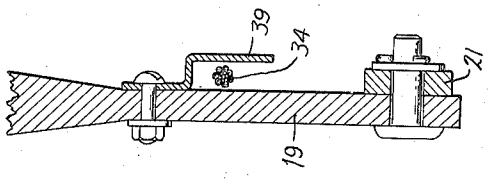


FIG. 4.

FIG. 3.

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Patented Aug. 9, 1938 2,126,118

UNITED STATES PATENT OFFICE

2,126,118

LOAD HANDLING MACHINE

George S. Kelley, Mount Vernon, N. Y.

Application February 17, 1936, Serial No. 64,236

2 Claims. (Cl. 212—39)

This invention relates to power operated load handling machines, and more particularly to an improved safety control means for such machines.

Load handling machines of this type are provided with a boom which is hoisted under power and may be lowered either under power or by gravity under the control of suitable braking means. A clutch is employed in a well-known manner to control raising and lowering of the boom.

However, in the conventional load handling machine of this type there is danger of the boom overswinging in an upright position with resultant injury to the machine and perhaps the operator. Normally this should not occur, since the operator does not permit the boom to be raised beyond a predetermined safe point but in the event that the operator does not properly gauge this point for any reason, and the clutch remains engaged, it is imperative that some means be provided for restraining raising of the boom beyond a safe point.

I have provided means associated with the boom and the boom hoist clutch whereby the clutch is automatically disengaged at a predetermined point preventing overswinging of the boom in raising the same. Additionally, independent means are provided checking upward movement of the boom at such point, thus providing a double safety feature.

It is an object of my invention, therefore, to provide in a load handling machine having a power operated boom, automatic means checking upward movement of the boom at a predetermined point.

Another object of my invention is to provide in a load handling machine provided with a power operated boom and clutch means operably connecting the boom hoist mechanism with the power source, automatic means for disengaging the clutch at a predetermined point in the upward swing of the boom.

Another object of my invention is to provide in a load handling machine having a boom, means positively opposing upward movement of the boom at a predetermined point.

Another object of my invention is to provide means associated with a power operated boom preventing upward swinging of the boom beyond a safe point.

Another object of my invention is to provide means associated with a power operated boom preventing upward swinging of the boom beyond a safe point which are relatively economical of construction and positive in operation.

Other objects of my invention and the invention itself will become increasingly apparent from a consideration of the following description and drawings wherein:

Fig. 1 is a diagrammatic view of a load handling machine incorporating my invention;

Fig. 2 is an enlarged fragmentary plan view of a portion of the machine illustrated in Fig. 1;

Fig. 3 is an enlarged elevational view of a portion of the mechanism illustrated in Fig. 2;

Fig. 4 is a section taken along line 4—4 of Fig. 3; and

Fig. 5 is a section taken along line 5—5 of Fig. 3.

Referring now to the drawings, I have illustrated in Fig. 1 a load handling machine comprising a base 10 upon which is rotatably mounted a superstructure 11 including a boom 12. The base 10 may be stationary or movably supported on a truck, the manner of mounting the base 10 constituting no essential part of my invention.

The superstructure 11 comprises a turntable generally indicated at 13 supporting the power unit and the power mechanism effecting swinging of the turntable and raising and lowering of the boom.

I contemplate that the machine illustrated may function as a crane, a power shovel, or the like, and the power mechanism operating the hoist cable, the dipper stick, or similar load engaging mechanism, will also be mounted on the turntable 13 in a conventional manner. However, my invention is applicable to any power operated load handling machine having a boom and provided with clutch means operably connecting the boom hoist mechanism with the power source.

The hoisting of the boom is effected in the conventional manner, the boom being pivotally secured at its foot to the turntable and provided with sheaves at its outer end through which boom supporting cables, generally indicated at 15, are reeved. The cables 15 have a dead end anchored to the turntable as indicated at 16 and the opposite end is wound around a boom hoist drum 17 which is rotated from the power unit through suitable mechanism, thereby swinging the boom upwardly. The boom hoist mechanism is adapted to be engaged and disengaged with the power unit by means of a clutch 18 controlled by a manually operable lever generally indicated at 19. The lowering of the boom is controlled in

various ways, as by maintaining the hoist mechanism coupled with the power unit wherein the power unit acts as a brake, or the boom may be lowered by gravity under the control of friction braking mechanism associated with the boom hoist mechanism. For purposes of illustration I have shown a type boom which is lowered under the control of braking mechanism.

A dog and ratchet arrangement is usually provided to prevent unintentional lowering of the boom upon disengagement of the clutch means. The mechanism so far described is well known in the art and constitutes no essential part of my invention.

The clutch lever 19 is pivotally supported on the turntable as indicated at 20, Fig. 3, the lower end of the clutch lever engaging a generally horizontally extending link 21 adapted to actuate the boom hoist clutch. The full line position of the clutch lever with the link element moved rearwardly indicates a clutch engaged position, and the dotted line position with the clutch lever substantially vertically disposed and with the link element 21 moved relatively forwardly indicates a clutch released position.

Normally the clutch lever 19 will be manually actuated to engage or disengage the clutch, but means now to be described will automatically disengage the clutch at a predetermined boom position.

The clutch mechanism will now be briefly described. The boom hoist drum 17 is rotatably mounted on a shaft 22 and may be operably coupled therewith through the clutch mechanism 18 whereby axial movement along shaft 22 toward the drum of a sleeve element 23 will cause an internally expanding clutch to engage the inner walls of an annular flange 24 integral with drum 17. Axial movement of the sleeve in a reverse direction will disengage the clutch. Clutches of this type are well known and any suitable clutch may be employed. A brake band 25 externally engages the flange 24 and is contractible by movement of sleeve 23 at a clutch disengaged position to apply braking action to the drum 17 upon release of the clutch.

Further movement of sleeve 23 outwardly from the drum 17 will release the brake with the clutch disengaged.

Link 21 actuates a bell crank 26 pivoted to the turntable which in turn through a strap 27 actuates a pivotally supported forked element 28 effecting movement of sleeve 23.

As best illustrated in Fig. 3, the boom adjacent the boom hinge pin and outwardly thereof is provided with a pin 30 having a connecting rod 31 pivotally secured thereto. The opposite end of the connecting rod 31 is pivotally secured to an arm 32 rotatably locked with a pulley 33. The pulley 33 is rotatably supported preferably by the boom foot casting.

A cable 34 has one end secured to the pulley 33 and then passes successively around pulleys 35 and 36 disposed beneath the deck 37 of the machine, the deck being perforated as at 38 for passage of the cable. The cable then passes through a guide clip 39 secured to the portion of the clutch lever beneath the machine deck 37 and intermediate the pivotal support 20 and the link 21. The guide clip is preferably of Z-form as illustrated in Fig. 4 and is secured to the clutch lever by screws or the like.

The cable 34 is extended a substantial distance rearwardly and has its opposite end secured to a tension spring 40 in any suitable manner, as by the provision of a cable clip 41. The opposite end of the spring 40 is secured to an eye bolt which in turn is secured to a deck beam or other fixed portion of the machine.

Adjacent the clutch lever 19 and rearwardly therefrom a follower clamp 42 is rigidly secured to the cable, the follower clamp preferably comprising two cooperating perforated sections clamped around the cable by means of bolts 43 and nuts 44. The forward face of the follower clamp is preferably of arcuate form to afford a better contact with the guide clip as the cable 34 is drawn forward against the tension of the spring 31.

It will now be understood that as the boom is raised the pulley 33 to which the cable 34 is anchored, will be rotated, causing the follower clamp 42 to engage the lever 19 and as the boom continues to move upwardly it forces the clutch lever 19 from an engaged position to a disengaged position as indicated in dotted lines.

The follower clamp 42 is adjustable along the cable 34 to control the predetermined boom position at which the clutch is disengaged. Upon lowering of the boom, the tension spring 40 will retract the follower clamp 42 from engagement with the clutch lever, permitting normal operation of the clutch lever until such time as the boom is again raised to the predetermined spaced position.

As previously stated, to prevent unintentional lowering of the boom, the boom hoist drum usually has a dog and ratchet arrangement associated therewith, and the boom cannot be lowered unless the ratchet is manually disengaged. Some booms are then lowered under power from the power unit which acts as a brake to prevent too rapid lowering of the boom, and in other constructions a brake drum is associated with the boom hoist drum to control gravity lowering of the boom as previously described.

The positive means checking upward movement of the boom substantially at the time the clutch is disengaged will now be described. Eye bolts 50 are secured to the forward portion of the turntable bed forwardly of and beneath the boom hinge pin, and the lower end of cables 51 are anchored thereto by cable clips 52 in the usual manner. The cables 51 are then passed through guide clips 53 secured to the underside of the boom and transversely spaced, are continued to substantially the central portion of the boom where the cables are anchored as by angle irons 54 secured to the underside of the boom substantially at the joint plates.

It will now be understood that as the boom is raised, the slack in the cables 51 in the low position will be gradually absorbed until, at a predetermined upswing position, the cables will become taut checking further upward movement of the boom. This predetermined position is adjusted so as to substantially coincide with the boom position at which the clutch is disengaged, whereby dual means operate at this position to check further upward boom movement beyond a safe point.

The guide clips are provided to support the cable in low boom position out of contact with the ground or objects thereon, and maintain the cable in close proximity to the underside of the boom.

Although I have shown and described a preferred embodiment of my invention, I contemplate that numerous and extensive departures may be made therefrom without departing from

the spirit of my invention and the scope of the appended claims.

Having thus described my invention, what I claim is:

1. In a load handling machine, a turntable, a boom pivotally supported at a forward portion of the turntable, means for raising the boom including a rotatably mounted drum, power means for actuating the drum, brake means associated with the drum, a clutch adapted to operably connect the drum with the power means, a manually operable handle pivotally supported by the turntable, having a portion extending beneath the turntable, said handle being adapted in one position to effect engagement of the clutch with the drum, in a second position being adapted to effect disengagement of the clutch with the drum and apply the brake means to the drum, and in a third position disengage the brake means while maintaining the clutch disengaged a cable movable by boom elevating movement against spring tension and extending beneath the turntable, an abutment adjustably fixed to the cable engageable with the handle lower portion to move the handle to a clutch disengaged and brake applied position at a predetermined upward position of the boom and preventing movement of the handle to a clutch disengaged position until the boom has been lowered, and the handle being adapted to be further moved in the direction effected by the abutment by manual effort to a brake disengaged position.

2. The load handling machine as described in claim 1, and wherein a crank movable by the boom rotates a pulley upon which the cable is wound to effect cable movement, and a guide element for the cable is provided on the handle lower portion maintaining the abutment in alignment to engage the handle lower portion.

GEORGE S. KELLEY.