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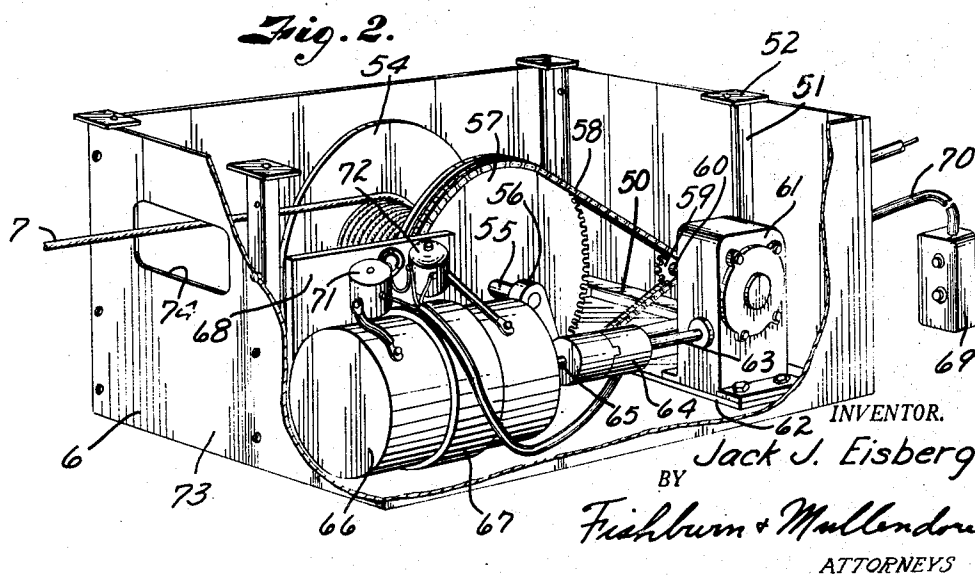
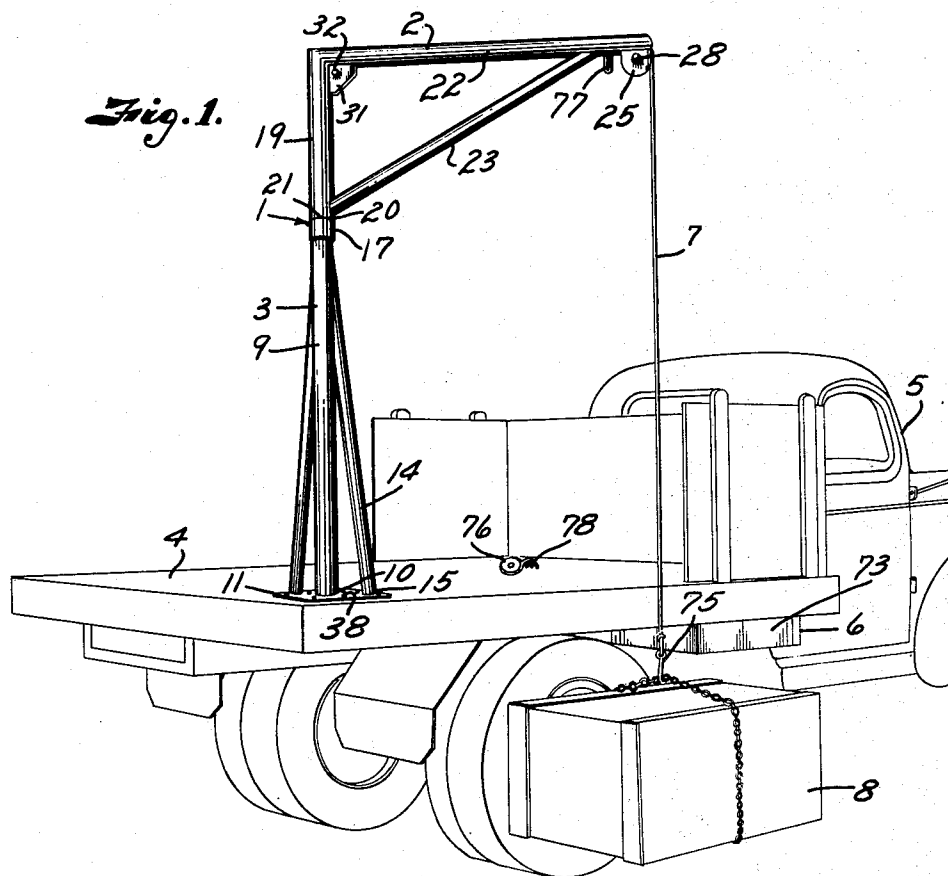
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HOIST AND POWER UNIT THEREFOR

Filed Oct. 18, 1950

2 Sheets-Sheet 1



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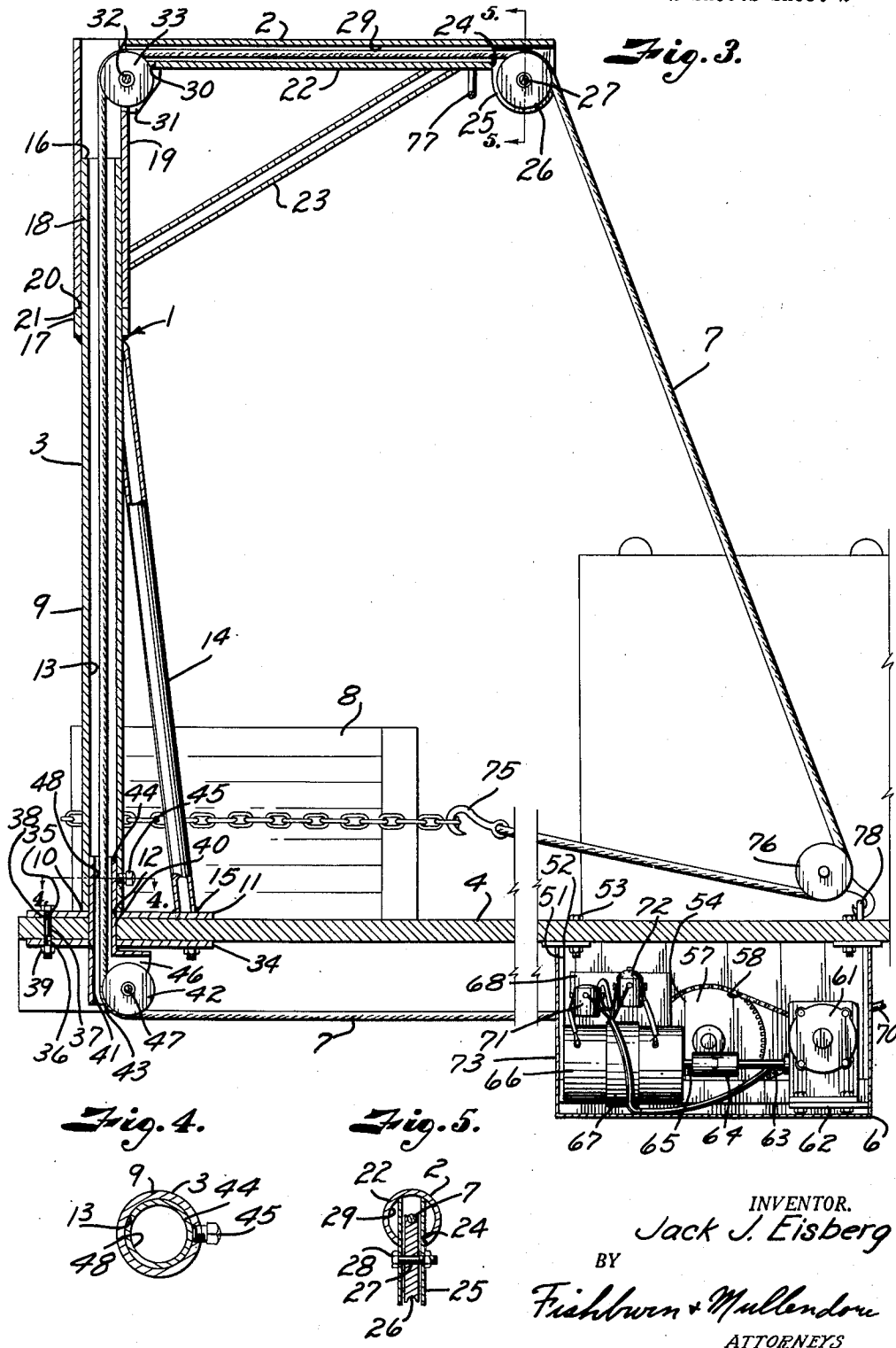
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UNITED STATES PATENT OFFICE

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HOIST AND POWER UNIT THEREFOR

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1 Claim. (Cl. 212-65)

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This invention relates to a load hoisting device and power unit therefor, and more particularly to such a device for mounting on a wheeled vehicle such as an open bed or van type truck with the power unit energized from the battery thereof.

The objects of the invention are to provide a mast and rotatable boom structure on a support, such as the bed or platform of a truck, and a reversible power unit under said bed or platform with suitable cable and sheave arrangements for operation in any position for lifting and moving loads; to provide a rotatable boom structure permitting swinging of same in a complete circle; to provide such a device with a hollow mast and boom structure through which the cable operates; to provide an adjustable sheave mounting at the lower end of the mast for maintaining alignment of the cable with the power unit winding drum; to provide a gear reduction in the power unit which serves as an automatic brake for holding the load in selected position; to provide a snatch block arrangement which cooperates with the hoist device for moving the load on a dock or truck bed; and to provide a light weight, yet sturdy device of this character, which is economical to manufacture, easy to install, and efficient and safe in operation.

In accomplishing these and other objects of the present invention, I have provided improved details of structure, the preferred forms of which are illustrated in the accompanying drawings, wherein:

Fig. 1 is a perspective view of the load hoisting device and power unit therefor mounted on an open bed type truck.

Fig. 2 is a perspective view of the power unit with portions of the housing broken away to better illustrate the arrangement thereof.

Fig. 3 is a vertical sectional view through the load lifting device and power unit therefor.

Fig. 4 is a transverse sectional view through the mast on the line 4-4, Fig. 3.

Fig. 5 is a transverse sectional view through the sheave mounting on the end of the boom on the line 5-5, Fig. 3.

Referring more in detail to the drawings:

1 designates a load lifting device which generally consists of a boom 2 rotatably mounted on a mast 3 mounted on the bed 4 of a truck 5, and a power unit 6 suitably mounted under the bed of said truck to provide power for operating a cable 7 for lifting heavy loads 8 and swinging same to and from the bed of the truck.

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The mast 3 preferably consists of a vertical tubular member 9, preferably cylindrical in shape, with its lower end secured as at 10 by welding or the like to a base or bed plate 11, adapted to rest on the upper surface of the truck bed 4, said base plate having an aperture 12 which substantially registers with the bore 13 of the tubular member 9. Diagonal braces 14, preferably tubular, have their lower ends suitably secured as by welding as at 15 to the base plate in spaced relation to the tubular member 9 and converge upwardly into engagement with the tubular member 9 in spaced relation to the upper end 16 thereof. The upper ends of the diagonal braces are preferably suitably secured as by welding to the tubular member 9 to brace and form a sturdy, rigid, light weight mast. A collar or other shoulder forming structure 17 is arranged on the tubular member 9 adjacent the upper end of the diagonal braces and spaced from the upper end 16 of the tubular member 9.

The portion 18 of the mast between the collar 17 and the upper end 16 is cylindrical to rotatably mount the boom 2 which preferably includes a tubular member 19 sleeved over the upper end of the mast and having a lower end 20 engaged with the shoulder 21 formed by the collar 17. The tubular member 19 of the boom extends above the upper end 16 of the mast and is provided with a boom arm 22 preferably tubular in shape and extending outwardly from the tubular portion 19. A stiff diagonal 23 preferably tubular has its ends welded to the tubular portion 19 and the boom arm 22 to provide a brace and form a rigid boom structure.

The boom arm 22 extends beyond the upper end of the diagonal 23 and its lower outer end is slotted as at 24 to receive spaced plates 25 that are welded to the inside of the arm and extend therebelow to form side plates for mounting the boom arm outer end sheave 26. The sheave 26 is rotatably mounted on the shank 27 of a bolt 28 that extends through suitable apertures in the plates 25. Other suitable sheave mounting members may be utilized to provide the sheave with a horizontal axis arranged relative to the boom arm 22 whereby the run of the cable 7 which operates over said sheave is substantially coaxial with the bore 29 of the boom arm 22.

The adjacent ends of the tubular portion 19 and arm 22 of the boom are slotted as at 30 in alignment with the sheave 26, and gusset plates 31 are secured as by welding to the tubular portion 19 and arm 22 on each side of the slot 30 to provide a support for a shank 32 on which

a sheave 33 is located, the shank 32 and sheave 33 being such that the runs of the cable operating thereover are substantially coaxial with the bore 29 of the boom arm 22 and the bore 13 of the tubular member 9 whereby rotation of the boom on the mast swings the boom arm in a complete circle and will not interfere with operation of the cable over the sheave pulleys 26 and 33.

When mounted on a truck bed the mast base plate 11 engages the upper surface thereof, and to aid in making a rigid mounting of the mast a subbase plate 34 engages the undersurface of the truck bed. The base plate and subbase plate are provided with a plurality of spaced apertures 35 and 36 respectively adjacent the peripheral edges thereof, which apertures align with apertures 37 in the truck bed for receiving bolts 38 and nuts 39 adapted to draw the plates into tight engagement with said truck bed. The subplate 34 and truck bed are provided with apertures 40 and 41 respectively which register with the bore 13 of the tubular member 9 whereby the cable 7 may extend through the bore 13 of the mast and under the truck bed to the power unit 6 which is suitably located under the truck bed.

In order to provide for proper directional operation of the cable from the power unit to the mast, a cable director sleeve 42 is rotatably and adjustably mounted under the truck bed. The cable director assembly 43 includes a tubular shank 44 which extends through the bores 12, 40 and 41 and is rotatably and slidably mounted in the bore 13 of the tubular member 9, suitable fastening devices such as setscrews 45 being arranged in the tubular member 9 adjacent the lower end thereof for anchoring the cable director assembly in selected position. The lower end of the shank 44 extends below the truck bed and is provided with side plates 46 which mount a shaft 47 for rotatably mounting the sheave 42 whereby the cable 7 operating thereover is coaxial with the bore 13 of the tubular member 9 and bore 48 of the shank 44 and the sheaves 26, 33 and 42 guide the cable and support same for operation through the mast and boom with all contact of the cable in said structure being only with the sheaves.

The power unit 6 has a rectangular frame 50 preferably formed of structural shapes and provided with upwardly extending corner posts 51 having plates 52 on the upper ends thereof which are secured in engagement with the underface of the truck bed by means of suitable fastening devices such as bolts 53 whereby the frame 50 is suspended from the truck bed. A drum 54 is fixed to a shaft 55 which is rotatably mounted in bearings 56 carried by the frame 50. The drum 54 carries the supply of the cable 7 and is driven to spool the cable thereon or to pay out the cable by means of a sprocket 57 fixed on the shaft 55. A chain 58 is operatively engaged with the sprocket 57 and is driven by a sprocket 59 fixed on the driven shaft 60 of a speed reducer 61. The speed reducer is preferably mounted on a support such as a plate 62 fixed to and extending laterally of the frame 50. The speed reducer is preferably of a worm gear type wherein the worm is driven by a shaft 63 connected by a coupling 64 with the shaft 65 of a reversible motor 66 secured by a band 67 to a bracket 68 carried by the frame 50. The motor 66 is preferably of the direct current type to operate off the battery carried by the truck and is controlled by suitable switches in a control box 69 in a conduit 70, the

conductors in which are connected to relays 71 and 72 mounted on the bracket 68 and connected into the motor circuit. The conduit 70 is preferably of considerable length whereby the power unit 6 may be remotely controlled as from the cab of the truck or by an operator at the side or rear thereof in a position to observe the movement of the load being lifted or lowered.

This arrangement of the motor, gear reduction and drum drive provides a positive reversible drive for the drum and the speed reducer is an automatic brake which will hold the load in any selected position. Also, being electrically driven, the power unit may be located under the truck bed as desired with the shaft 55 perpendicular to a line from the drum to the axial center of the tubular member 9 of the mast 3.

A housing 73 formed of sheet metal or the like is arranged to be secured to the frame and corner posts 51 with the open upper end of the housing substantially engaging the plates 52 to protect the power unit from water, dirt and the like, said housing having an aperture 74 through which the cable 7 passes in spooling on the drum 54.

When mounting a hoisting device constructed as described on a truck, the base plate 11 is positioned on top of the truck bed as close to the edges thereof as is practical. Then the apertures 37 and bore 41 are cut into the truck bed. The power unit is then located under the truck bed in any desired position with the center of the cable drum 54 aligned with the center of the mast hole 41, the shaft 55 being perpendicular to said line between the cable drum and mast hole. The power unit is then secured to the truck bed by the bolts 53. The base plate and subplate are then secured to the truck bed by means of the bolts and nuts 38 and 39 to secure the mast to the truck bed. The boom is then mounted on the mast by sleeving the portion 19 over the upper cylindrical end of the mast with the lower end of the tubular portion 19 engaging the shoulder 21. The boom is then free to rotate about the mast. The end of the cable 7 is then inserted into the boom arm over the boom sheave 29 and out of the other end of said boom arm where the cable is turned downwardly over the sheave 33 and on through the tubular member 9 of the mast and out of the bottom thereof under the truck bed. The cable is then inserted through the shank 44 of the cable director and under the cable director sheave 42 through the aperture 74. The end of the cable is then attached to the cable drum in a suitable manner. The shank 44 of the cable director is then sleeved into the bores 40, 41 and 13 and adjusted therein until the sheave 42 is positioned properly in alignment with the line to the center of the cable drum and the cable therebetween substantially on a horizontal line. The conduit furnishing the power is connected to the battery of the truck and then by operating the control box 69 the motor 66 will be energized to rotate the shaft 55 to drive the gears in the gear reduction 61 and effect rotation at a reduced speed of the driven shaft 60 and sprocket 59 thereon which in turn effects rotation of the sprocket 57 and the cable drum 54 to draw the cable through the boom and mast and wind said cable on the drum. The free end of the cable is preferably provided with a hook or the like 75 or other suitable device for connection with the load to be lifted. If the load is very heavy a split snatch block 76 may be applied to the cable intermediate the hook 75 and sheave 29 and the hook 75 con-

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connected with a loop 77 fixed on the boom arm 22 intermediate the end of the diagonal 23 and the sheave 26. Then the hook on the snatch block may be connected with the load to be lifted, thereby increasing the capacity of the device.

Also, on particularly heavy loads, it is desirable to skid same onto the truck from a dock or after being raised and placed on the truck bed it is desirable to skid same toward the cab. For such operations a loop 78 is fixed to the truck bed adjacent the cab end thereof and the hook of the split snatch block connected thereto. Then the hook 75 may be connected to the load and by operation of the power unit to wind the cable on the drum 54 power will be applied to the load to move same on the truck bed, as illustrated in Fig. 3.

It is believed obvious that I have provided a load hoisting device and power unit therefor that is light in weight, economical to manufacture, easy to install and efficient in operation to provide faster and easier handling of heavy loads.

What I claim and desire to secure by Letters Patent is:

In a motor vehicle having a bed, a battery, a hoist with a tubular arm rotatable on a tubular mast supported on the vehicle bed with sheave pulleys rotatably mounted at each end of the tubular arm, and a cable extending through the tubular mast and tubular arm for attachment to a load to be lifted, said sheave pulleys being positioned whereby the cable operates over the pulleys and substantially axially of the tubular mast and tubular arm, a power unit comprising, a frame suspended from the vehicle bed, a drum rotatably mounted on the frame and having one end of the cable wound thereon, the axis of the drum being substantially perpendicular to a line from the center of the drum to the axis of the mast, a sheave pulley under the vehicle bed and adjustably mounted on the lower end of the

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tubular mast for rotation and longitudinal movement relative to said mast for positioning said sheave pulley to direct the cable toward the drum, a sprocket at one end of and drivingly connected to the drum, a worm gear speed reducer on the frame in spaced relation to the drum, a reversible electric motor on the frame and having driving connection with the worm gear in the speed reducer, a driven shaft in the speed reducer which operates only on operation of the reversible motor, a sprocket fixed to said driven shaft, a chain operatively connecting the sprocket on the driven shaft with the sprocket connected to the drum whereby only operation of the motor rotates the drum to wind and unwind the cable on said drum, a housing secured to the frame for substantially enclosing the drum, speed reducer and motor, said housing having an opening therein between the drum and mast for the cable, an electric circuit connected to the battery for energizing the reversible motor, relay switches in the electric circuit for controlling the direction of operation of the motor, and means in the circuit for selectively operating the relay switches for completing circuit to the motor to energize same.

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