Aug. 7, 1962 M. KLIMEK, JR 3,048,371

ELECTRICALLY OPERATED WINCH FOR A CRANE

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FIG. 1.

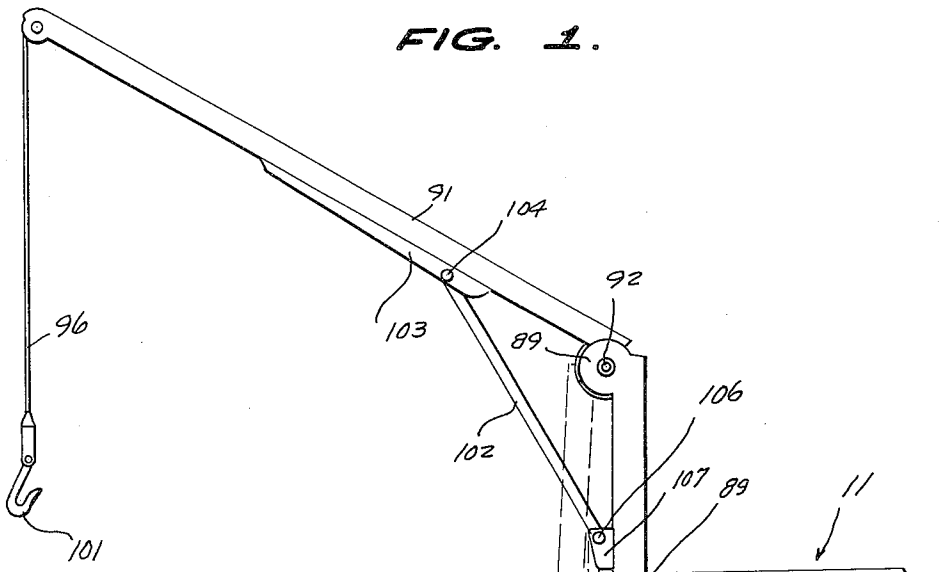

FIG. 10.

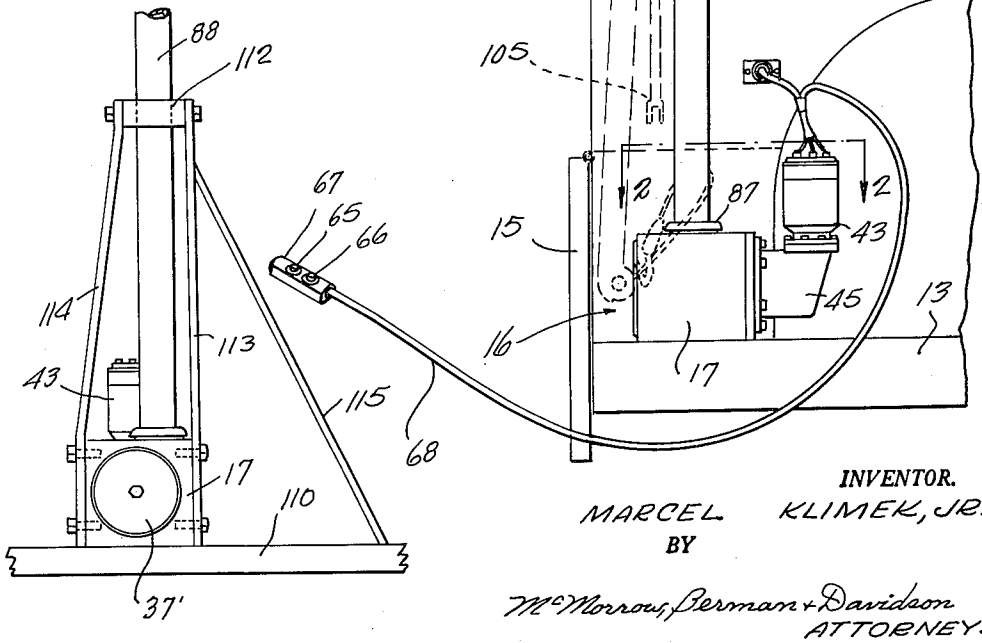

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FIG. 2.

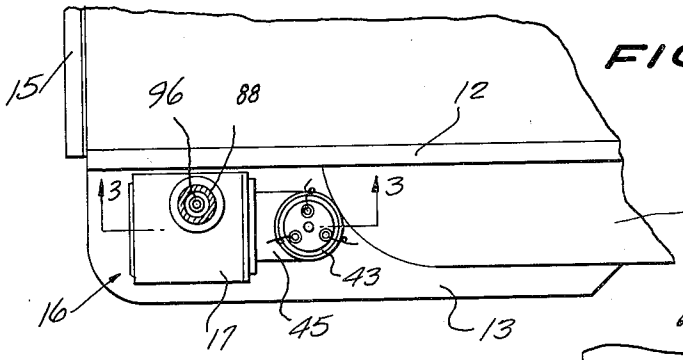


FIG. 5.

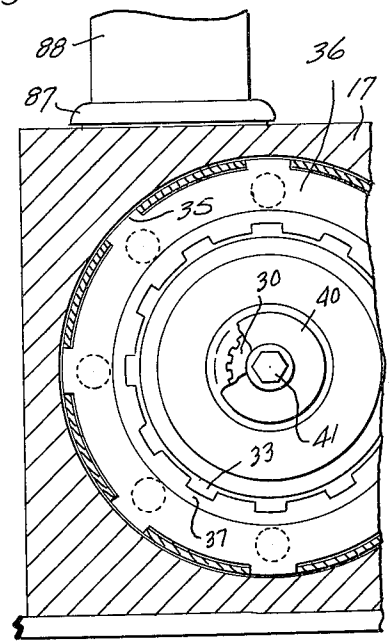
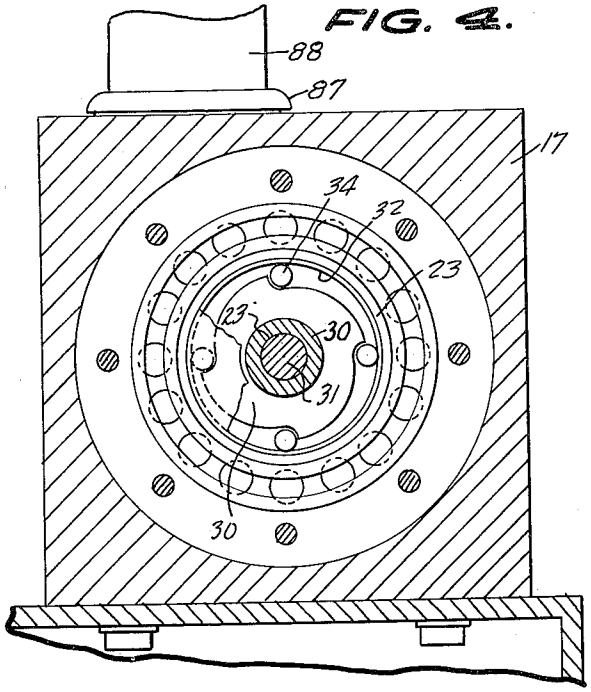


FIG. 4.



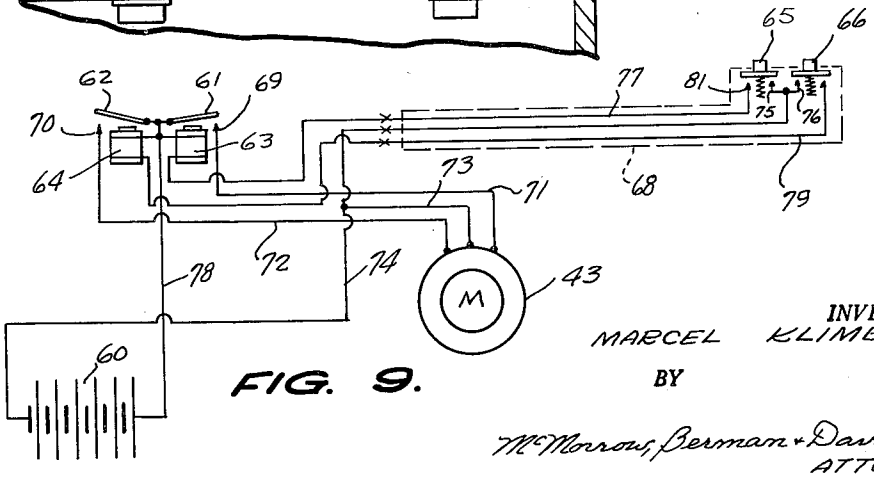


FIG. 9.

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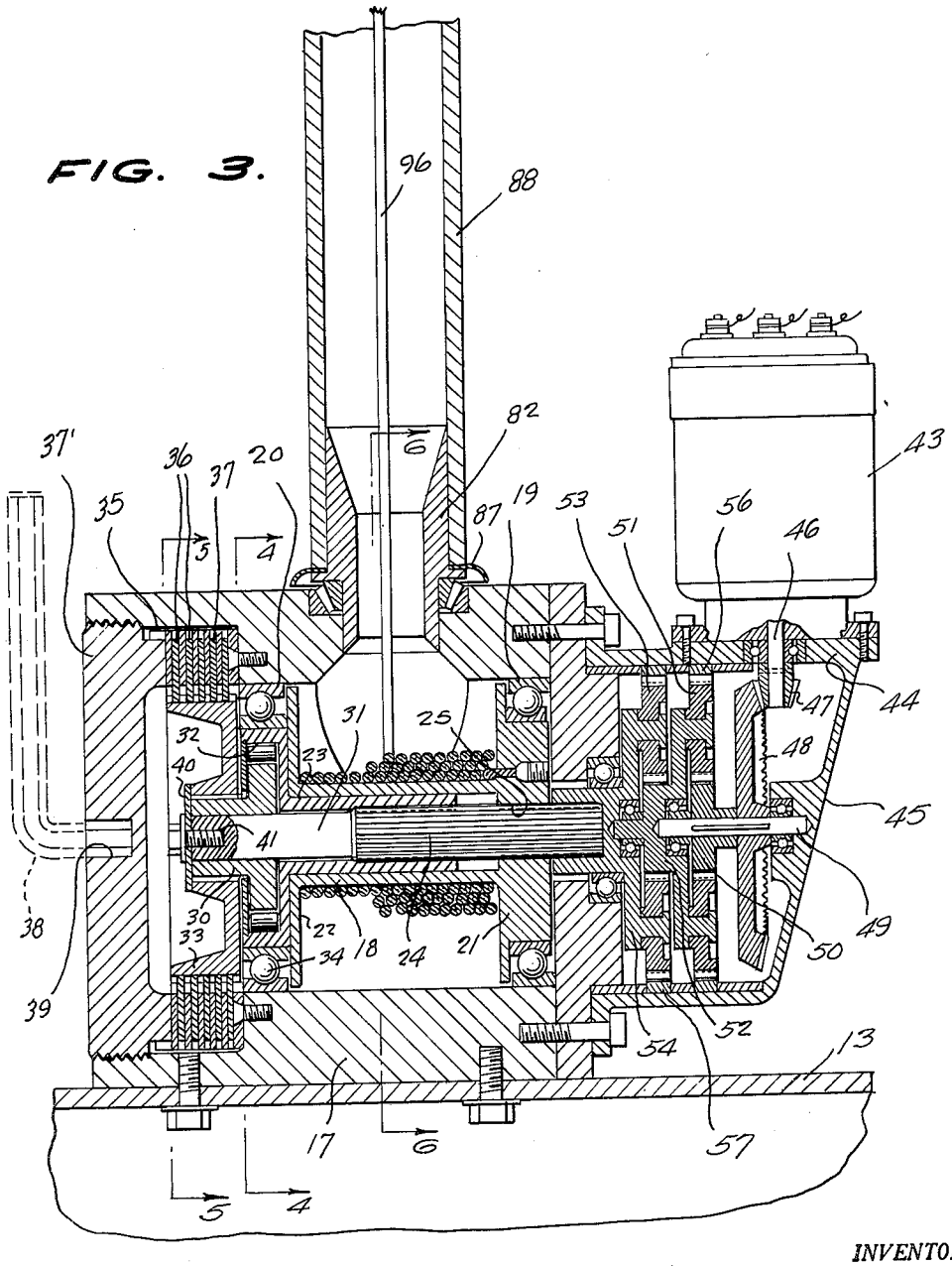
FIG. 3.



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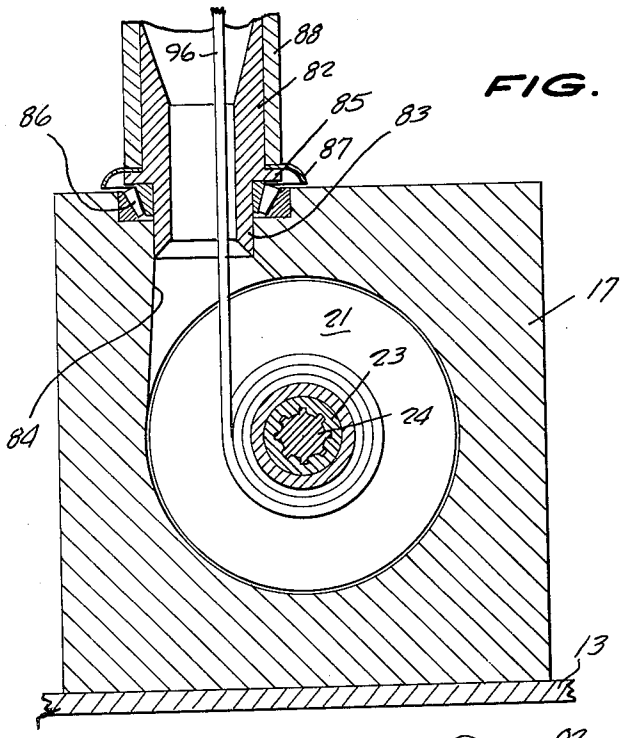

FIG. 6.

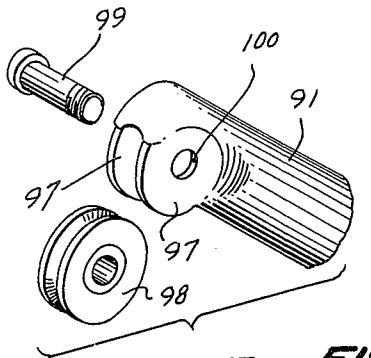

FIG. 7.

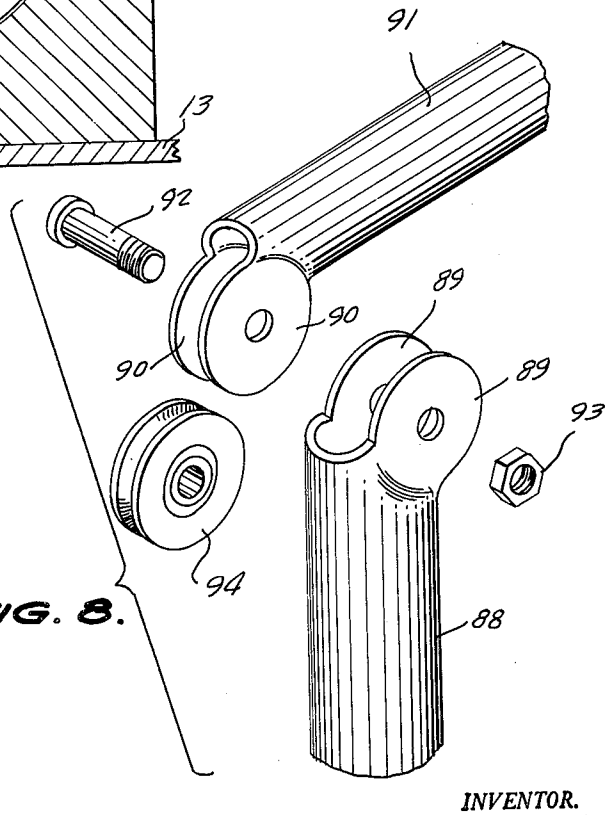

FIG. 8.

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ELECTRICALLY OPERATED WINCH FOR A CRANE

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1 Claim. (Cl. 254—187)

This invention relates to hoisting devices, and more particularly to a crane assembly especially adapted to be mounted on a motor vehicle or other wheeled vehicle.

A main object of the invention is to provide a novel and improved crane assembly which involves simple components, which is easy to install on a truck or other wheeled vehicle, and which is arranged so that one operator may employ the device to pick up heavy loads and place the loads on the vehicle, or to remove such loads from the vehicle.

A further object of the invention is to provide an improved electrically operated crane assembly especially adapted for use on a truck or other motor vehicle, the assembly involving inexpensive components, being rugged in construction, being operable from a position relatively remote from the main components of the assembly, and being reliable in operation.

A still further object of the invention is to provide an improved electrically operated crane assembly for use on a truck or similar motor vehicle, the assembly being foldable to a relatively compact condition when not in use and being easy to set up for use whenever required.

Further objects and advantages of the invention will become apparent from the following description and claim, and from the accompanying drawings, wherein:

FIGURE 1 is an elevational view of an improved electrically operated crane assembly constructed in accordance with the present invention and shown mounted on the side portion of a vehicle body.

FIGURE 2 is a horizontal cross sectional view taken substantially on the line 2—2 of FIGURE 1.

FIGURE 3 is an enlarged vertical cross sectional view taken on the line 3—3 of FIGURE 2.

FIGURE 4 is a transverse vertical cross sectional view taken on line 4—4 of FIGURE 3 with a part broken away for clarity.

FIGURE 5 is a transverse vertical cross sectional view taken on the line 5—5 of FIGURE 3.

FIGURE 6 is a transverse vertical cross sectional view taken on the line 6—6 of FIGURE 3.

FIGURE 7 is an enlarged perspective view of the outer end portion of the boom member employed in the crane assembly of FIGURES 1 to 5 and the associated pulley and pivot pin, the parts being shown in separated position.

FIGURE 8 is an enlarged perspective view of the connecting end portions of the vertical post and the boom member employed in the crane assembly of FIGURES 1 to 6, with the associated pulley and pivot bolt employed at the pivotal connection between the boom and the post, the parts being shown in separated position.

FIGURE 9 is a schematic wiring diagram showing the electrical connections of the reversible motor employed in the crane assembly of FIGURES 1 to 9.

FIGURE 10 is an elevational view showing the manner in which a crane assembly according to the present invention may be mounted on a flat truck bed or on any other horizontal supporting surface of a vehicle.

Referring to the drawings, 11 generally designates a conventional truck body which is provided with the vertical, longitudinally extending side walls 12, supported on a frame including longitudinally extending, substantially horizontal members 13 which project rearwardly adjacent the rear fenders 14 of the truck. The truck body 11 may be of any conventional construction, for

example, the type including the rearwardly swingable tail gate 15.

Designated generally at 16 is a crane assembly according to the present invention which is mounted on the rearwardly extending portion of the side frame member 13, being located rearwardly adjacent the fender 14, as is illustrated in FIGURE 2.

The crane assembly 16 comprises a main supporting housing 17 in which is rotatably mounted the hoist reel 18, the reel being mounted horizontally, as shown in FIGURE 3, and being journaled at its opposite ends by suitable ball bearing assemblies 19 and 20 which rotatably support the respective annular opposite end flange portions 21 and 22 of the reel.

As shown in FIGURE 3, the reel comprises an annular body having the integral opposite end flanges 21 and 22, said body receiving and being rigidly secured to an inner annular element 23 which is splined to a shaft 24. The main section of the reel is also splined to the shaft 24 at the central portion 25 of the main flange 21.

Designated at 30 is the hub portion of a conventional overrunning clutch assembly which is rotatably mounted on the end portion 31 of shaft 24 and which is received in an annular recess 32 formed in the cable reel segment 23. The hub member 30 is splined to a brake hub 33 which is thus disposed concentrically with the shaft end portion 31 and which is thus coupled at times to the reel segment 23 through the over-running clutch assembly through the roller elements 34 of said assembly. Thus, when the shaft 24 rotates in a counterclockwise direction, as viewed in FIGURE 4, the clutch hub 30 wedgingly interengages with the rollers 34 to lock the hub 30 with respect to the reel segment 23, whereby the hub 30 rotates with the reel. This couples the reel to the brake hub 33 for rotation of the shaft 24 in a counterclockwise direction, as viewed in FIGURE 4. However, when the shaft portion 31 rotates clockwise, as viewed in FIGURE 4, the rollers 34 are free to rotate and are not wedged between the hub 30 and the reel segment 23, so that the brake hub 33 is uncoupled with respect to the shaft 24.

The supporting housing 17 is formed with an annular recess 35 concentric with the brake hub 33 and receiving a plurality of annular disc elements 36 splined on the hub 33. Annular brake discs 37 are splined in the recess 35 on opposite sides of the hub discs 36 in frictional engagement therewith. Designated at 37' is a brake adjusting disc which is threadedly engaged in the end of the recess 35 and which may be adjusted by means of a suitable wrench 38 engaged in a hexagonal recess 39 centrally formed in the member 37' to adjust the pressure exerted by the member 37' on the brake disc elements 36 and 37. This provides a means for adjusting the amount of retarding frictional force between the brake hub member 33 and the supporting member 17.

As above mentioned, the over-running clutch assembly couples the reel segment 23 to the brake hub member 33 only when the shaft 24 rotates in a counterclockwise direction, as viewed in FIGURE 4. Thus, the braking effect is applied to the reel only during the counterclockwise rotation of the shaft 24, as viewed in FIGURE 4, the reel being released from the retarding force of the brake assembly during clockwise movement of shaft 24.

As above stated, the brake hub member 33 is splined to the clutch hub member 30, and the member 33 is retained in engagement with the hub member 30 by a retaining disc 40 which is clamped against the end of the shaft portion 31 by an axial clamping screw 41, as is clearly shown in FIGURE 3, the disc 40 also being in engagement with the central portion of the hub 33. The disc 40 is freely rotatable both with respect to the clutch hub 30 and the brake hub 33.

Designated at 43 is a reversible electric motor which is vertically mounted on the top wall 44 of a conventional speed reducing gear assembly 45 which gearingly couples the shaft 46 of the motor 43 to the reel shaft 24. Thus, a pinion gear 47 is mounted on the end of the motor shaft 46, the pinion gear 47 being in meshing engagement with a relatively large bevel gear 48. The gear 48 is splined to a shaft 49 on which is secured a small gear 50 which meshingly engages planet gears 51 journaled on axes at equal radial distances on a gear 52, which in turn meshes with the planet gears 53 journaled on axes at equal radial distances on a driving disc member 54 which is splined to the end of the shaft 24. The planet gears 51 and 53 meshingly engage internally facing ring gears 56 and 57 rigidly mounted in the housing of the reduction unit 45, whereby the planet gears 51 and 53 are constrained to rotate around the toothed inner portions of the ring gears 56 and 57, or whereby to transmit driving torque to the members 52 and 54.

The reversible electric motor 43 is conventional in construction and is adapted to be energized from the motor vehicle battery 60 by a circuit such as that illustrated in FIGURE 9. The respective windings of the motor 43 are energized through the armatures 61 or 62 of respective relays 63 and 64, the relays being controlled by respective push button switches 65 and 66 mounted in a suitable housing 67 and connected by a suitable multiple conductor cable 68 to the motor 43, as shown in FIGURE 1. The respective relay contacts 69 and 70 are connected to the respective reversing windings of motor 43 by wires 71 and 72. The common terminal of the reversing windings is connected by a wire 73 to the battery wire 74. Battery wire 74 is connected to the terminals 75 and 76 of the push button switches 65 and 66. The remaining terminal of the push button switch 65 is connected by a wire 77 through the winding of the relay 63 to the remaining battery wire 78, said battery wire 78 being connected to the armatures 61 and 62, as shown. The remaining terminal of the switch 66 is connected by a wire 79 through the winding of relay 64 to the battery wire 78.

When switch 65 is closed, the winding of relay 63 is energized by a circuit comprising battery 60, wire 74, contact 75, the pole of switch 65, the remaining contact 81 of said switch, the wire 77, the winding of the relay 63, and the battery wire 78. Armature 61 engages its contact 69, thus connecting one of the windings of motor 43 to the battery 60 through a circuit comprising battery wire 78, armature 61, contact 69, wire 71, the winding of the motor 43, wire 73, and wire 74.

The other winding of the motor 43 may be similarly energized by closing the switch 66 by a similar circuit arrangement, which includes the armature 62 and the contact 70 of the relay 64.

As will be apparent from FIGURES 3 and 5, the brake disc elements 36 are movable longitudinally with respect to the hub 33, being splined thereon, but being constrained to rotate therewith. Similarly, the cooperating brake disc elements 37 are movable longitudinally in the recess 35 but are held against rotation therein since they are splined in said recess. Thus, the frictional engagement between the brake disc elements 36 and 37 may be adjusted by rotating the adjusting cap 37', since the disc elements 36 and 37 are free to be moved longitudinally, namely, in an axial direction, although the disc members 37 are restrained against rotation with respect to the supporting housing 17 and the disc members 36 are restrained against rotation with respect to the brake hub 33.

Designated at 82 is an annular, vertically extending bearing member which is journaled in the top wall of the supporting housing 17 above, and substantially tangential to the intermediate portion of the cable reel assembly 18. Thus, as shown in FIGURE 6, the annular bearing member 82 is provided with a depending reduced bottom portion 83 which extends into the reel cavity 84 of the support member 17, the member 82 being formed with an annular flange 85 which is journaled on the top wall of the supporting housing 17 by a cone bearing assembly 86. An outwardly and downwardly curved annular protective skirt 87 is provided on the flange 85, protectively overlying the cone bearing assembly 86, as is clearly shown in FIGURE 6.

Rigidly secured on the vertical bearing member 82 is the tubular vertical post 88, the post extending rotatably through a supporting bracket 89 secured to the top margin of the adjacent side wall 12 of the truck body, as shown in FIGURE 1. The top end of the post 88 is formed with the parallel, substantially circular spaced wing elements 89, 89 which receive similar spaced substantially circular wing elements 90, 90 of a tubular boom member 91, and which are pivotally connected thereto by a horizontal pivot pin 92 extending through registering central apertures provided in the wing members 90 and 89 and which is secured in place by a fastening nut 93 threadedly engaged on its outer end. A cable pulley 94 is journaled on the intermediate portion of the pivot pin 92, being thus positioned between the inner pivot wings 90,90 and receiving the cable 96 thereover. Cable 96 is wound on the reel assembly 18 and extends upwardly through the bearing member 82 and the tubular post 88.

As shown in FIGURE 7, the boom member 91 is formed at its outer end with a pair of parallel, generally semi-circular wing elements 97, 97 between which is journaled a cable reel 98, the reel 98 being rotatably supported on a horizontal pin member 99 which extends through central apertures 100 provided in the wing elements 97 and which thus rotatably supports the pulley 98 between said wing elements. A suitable retaining nut is threadedly engaged on the outer end of the pulley-supporting pin 99. The cable 96 extends over the pulley 98 and is provided at its end with a suitable load-supporting hook 101.

Designated at 102 is a strut member whose top end is received between depending spaced flanges 103 provided on the intermediate portion of the boom member 91 and is pivotally connected thereto by a transverse pivot pin 104. The lower end of the strut member 102 is formed with a fork element 105 which is engageable on a transverse supporting pin 106 secured between a pair of spaced flanges 107 provided on the intermediate portion of the post 88, above the bracket 89, as shown in FIGURE 1. This enables the strut member 102 to be lockingly engaged on the pin 106 to thereby support the boom member 91 in an elevated position, such as that illustrated in FIGURE 1. When the device is not in use, the boom member 91 may be lifted sufficiently to disengage the fork element 105 from the supporting pin 106, thereby allowing the boom member 91 to be lowered to a position closely adjacent to the post 88, as shown in dotted view in FIGURE 1, whereby to reduce the bulk of the assembly.

In operation, the device is set up in the position illustrated in FIGURE 1, whereby the boom member 91 is supported in an upstanding position and whereby said boom member 91 may be swung around the vertical axis defined by the post 88. The motor 43 may be energized to rotate in either direction by actuating the push button 65 or 66, depending upon whether the load is to be raised or lowered. When motor 43 is energized to raise the hook element 101, the shaft 24 rotates freely with respect to the brake elements, as above described. When the motor is deenergized the tendency of the reel shaft 24 to rotate in the opposite direction is opposed by the brake action. This allows the load to be held up. To control the descent of the load, the motor 43 may be energized in its opposite direction, whereby to apply positive driving torque to the reel assembly 18, against the braking action, whereby the load may be lowered.

As shown in FIGURE 10, the crane assembly may be

installed on the flat bed **110** of a flat bed truck, the housing **17** being mounted directly on the bed **110** and the vertical post **88** being rotatably supported in a suitable bracket **112** secured between the top ends of upstanding supporting bars **113** and **114**. The lower portions of the bars **113** and **114** are secured to the housing **17**. Further brace bars, such as the inclined brace bar **115** may be employed to rigidify and strengthen the supporting structure for the post **88**.

While certain specific embodiments of an improved crane assembly for use on a motor vehicle have been disclosed in the foregoing description, it will be understood that various modifications within the spirit of the invention may occur to those skilled in the art. Therefore, it is intended that no limitations be placed on the invention except as defined by the scope of the appended claim.

What is claimed is:

In a crane assembly, a support, a winch reel journaled horizontally on said support, a reversible electric motor mounted on said support, adjustable brake means on the support, an over-running clutch assembly mounted between said winch reel and said brake means, said clutch assembly comprising means coupling the winch reel to said brake means responsive to rotation of the reel in one direction and means to release the winch reel from the brake means responsive to rotation of the reel in the opposite direction, said brake means comprising annular friction disc means slidably and non-rotatably connected to the clutch assembly, cooperating friction disc means slidably and non-rotatably connected to the support, and an adjusting disc member threadedly engaged at its periphery with the support coaxially with said friction disc means and being movable axially against the friction disc means responsive to rotation thereof to regulate the degree of frictional engagement thereof, said friction disc means interengaging to retard rotation of the clutch assembly relative to said support during rotation of the reel in said one direction, means drivingly coupling said motor to said reel, and a cable wound on said winch reel.

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