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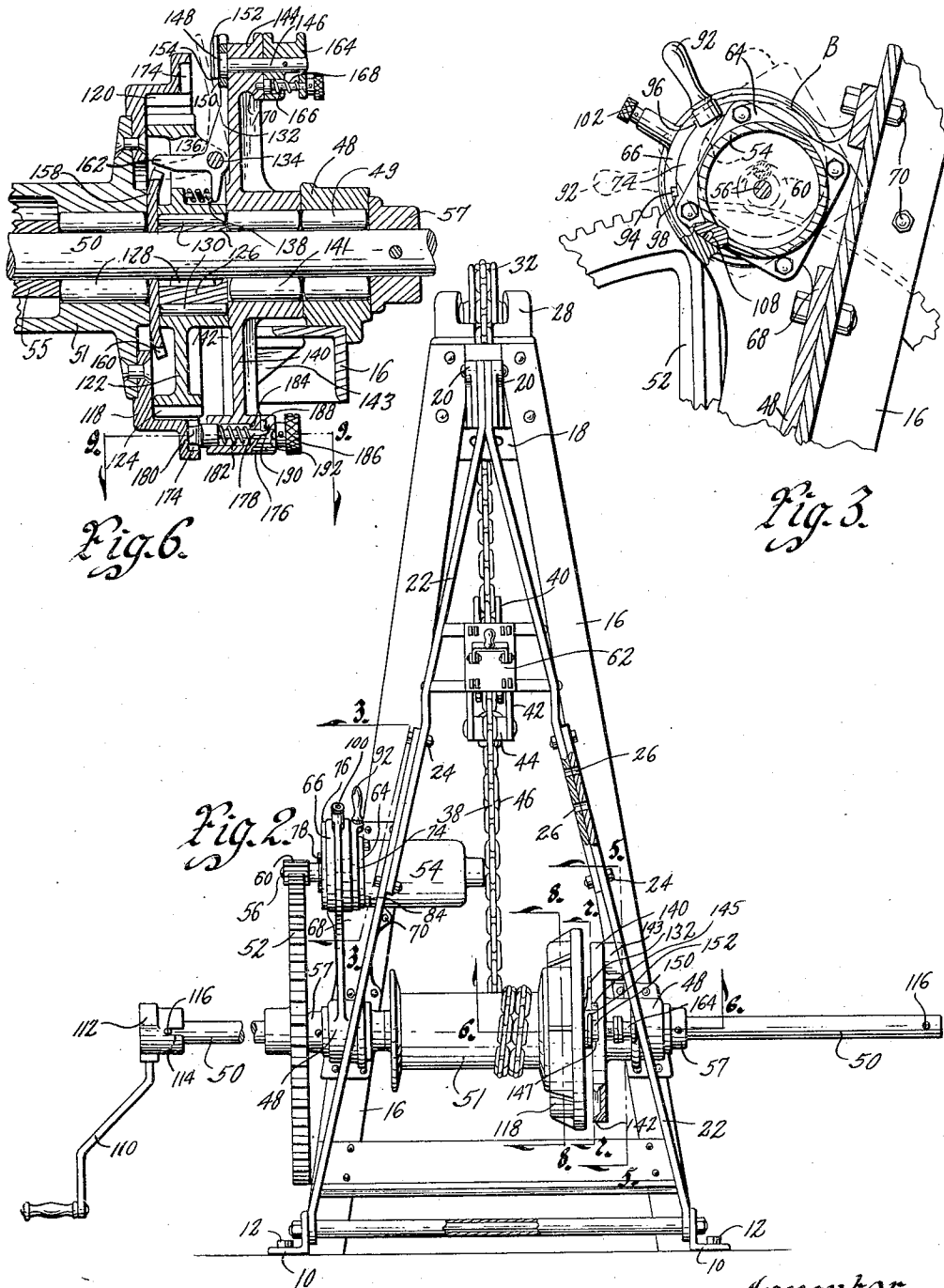
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1,790,243

DISCONNECTIBLE DRIVING MECHANISM

Filed Nov. 11, 1926

3 Sheets-Sheet 2



Witness
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Inventor
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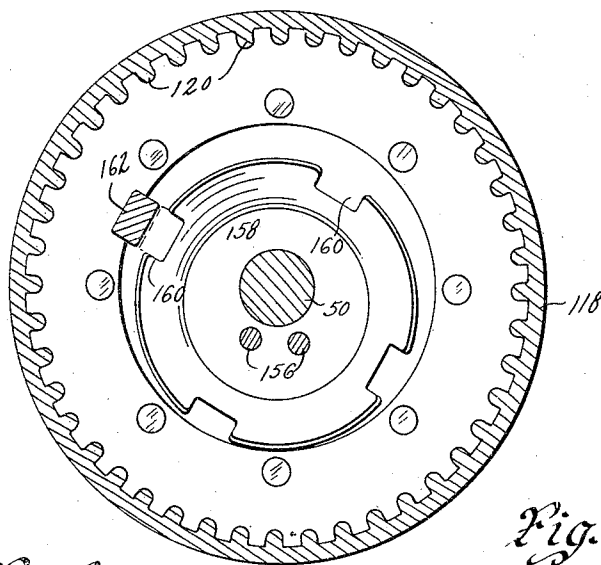


Fig. 7

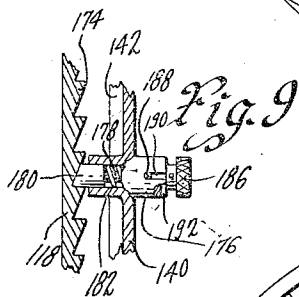


Fig. 9

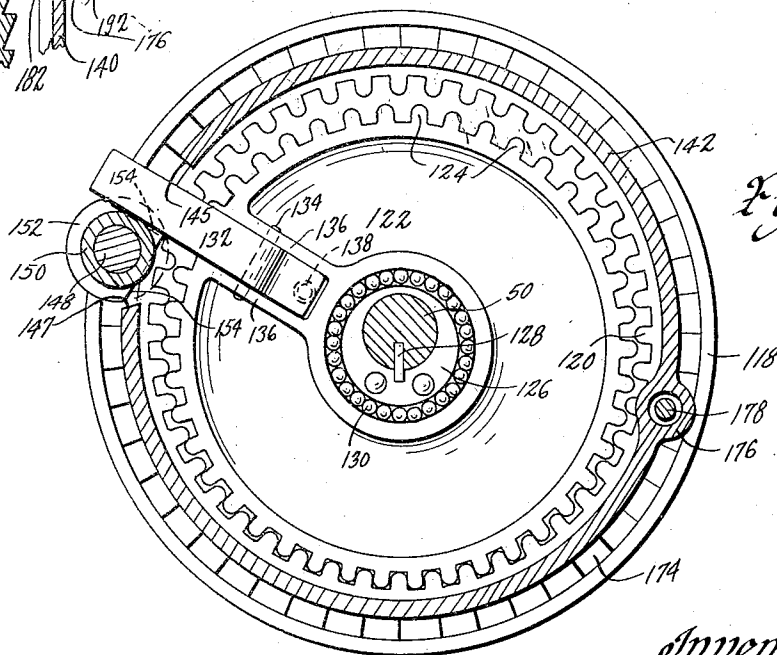


Fig. 8

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DISCONNECTIBLE DRIVING MECHANISM

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The object of my invention is to provide a crane mechanism especially adapted for use in automobile service wrecking cars, the crane being electrically operated and of comparatively simple, durable and inexpensive construction.

A further object of my crane mechanism is to provide a device driven by an electric motor or the like which may be controlled by a reversing switch structure for raising or lowering the load to be handled.

Still a further object is to provide gearing mechanism for reducing the speed of the winding drum relative to the motor whereby a great load can be handled by a comparatively small motor.

Another object is to provide mechanism for disconnecting the gearing mechanism for reducing the speed of the drum and at the same time operatively connecting parts of the mechanism whereby the drum may be operated at high speed for quickly adjusting the hook on the crane to the load to be lifted.

A further object is to so arrange my improved crane so that it may be either motor driven or hand operated or may be hand operated in conjunction with the motor for handling a load heavier than that capable of being handled by the motor alone.

A further object is to provide conveniently accessible and readily operable means for disconnecting the motor from the crane mechanism when it is desired to operate the crane entirely by hand.

More particularly it is my object to provide means for disconnecting the motor from the crane mechanism in the form of a bracket having a motor supporting member rotatably mounted on the support whereby rotation of the support will move the motor toward or away from that portion of the mechanism of the crane with which the motor, when being used, is operatively connected.

Still a further object is to provide means for moving the motor bodily to operative or inoperative positions relative to the crane mechanism and locking mechanism for locking the motor in either of such positions.

A further object is to provide a ratchet

mechanism to coact with the crane mechanism as the load is being raised and readily operable means for rendering the ratchet mechanism inoperative when it is desired to lower the load or unwind the winding drum.

With these and other objects in view, my invention consists in the construction, arrangement and combination of the various parts of my device, whereby the objects contemplated are attained, as hereinafter more fully set forth, pointed out in my claims, and illustrated in the accompanying drawings, in which:

Figure 1 is a side elevation of my crane mechanism illustrating a hook thereon for engaging the load to be lifted.

Figure 2 is an end elevation of my crane mechanism.

Figure 3 is an enlarged detail sectional view taken on the line 3—3 of Figure 2 and illustrates the motor mounting when in position for operating the winding drum and the dotted line position illustrates the inoperative position.

Figure 4 is an enlarged detail sectional view taken on the line 4—4 of Figure 1 and illustrates the construction of the motor mounting.

Figure 5 is a sectional view taken on the line 5—5 of Figure 2 and shows an end view of the speed reducing mechanism, parts of the frame to which it is attached being shown in section.

Figure 6 is an enlarged detail view taken on the line 6—6 of Figure 2 and illustrates the construction of the speed reducing mechanism.

Figure 7 is an enlarged detail view taken on the line 7—7 of Figure 2.

Figure 8 is an enlarged detail sectional view taken on the line 8—8 of Figure 2 and shows the gears used in the speed reducing mechanism of the crane; and

Figure 9 is a sectional view on the line 9—9 of Figure 6 illustrating the ratchet mechanism of the winding drum.

In the accompanying drawings I have used the reference letter A to indicate generally the frame of my improved crane. The frame

A is comprised of base angles 10 which may be secured to the bottom of the bed of a wrecking car or to some suitable support in a garage by bolts 12 or the like extending through the horizontal flanges of the angles 10. Pivoted to the angles 10 by means of pivot bolts 14 are upright boom members 16 of angle construction. The upper ends of the members 16 are secured to a socket fitting 18 whereby they are rigidly connected together at their upper ends. The socket member 18 is provided with ears 20 to which are pivoted brace bars 22. The brace bars 22 are made in upper and lower sections, the sections being adjustable secured to each other by means of bolts 24 extending through openings 26 formed in the brace bars 22. A plurality of the openings 26 are provided whereby this adjustment is possible by inserting the bolts 24 selectively through different openings in the brace bars 22. From the foregoing it will be obvious that any desired overhang or angle of the top of the boom of the crane may be had within certain limits by adjusting the bars 22 relative to each other.

Rotatably mounted in the socket member 18 is a pulley fitting 28. The pulley fitting 28 has a spindle portion 30 which extends into the socket opening of the socket member 18. Rotatably supported between the side members of the pulley fitting 28 is a pulley 32.

A clevis member 34 is pivotally supported on the socket member 18 and is designed for receiving the hook 36. Secured to the hook 36 is a chain 38 which extends downwardly therefrom and around a pulley 40 thence upwardly and over the pulley 32. The chain 38 then extends downwardly as shown by the dotted lines in Figure 1 to a winding drum which will hereinafter be described. The pulley 40 supports a pair of links 42 to which are pivoted a swivel fitting 44. A lifting hook 46 is rotatably suspended from the swivel fitting 44 and is designed to engage a portion of an automobile or the like when the crane is being used.

On the upright boom members 16 are mounted a pair of bearing members 48. Rotatably mounted in the bearings 48 is a shaft 50. The shaft 50 has secured thereto a gear wheel 52. A drum 51 is mounted upon the shaft 50 and one end of the chain 38 is secured to the drum so that the chain may be wound therearound. Rotation of the gear 52 or shaft 50 will impart rotary movement to the drum 51.

For rotating the gear wheel 52 and consequently the shaft 50 I provide an electric motor 54. A motor shaft 56 has a pinion 60 keyed thereon by means of a key 58. The motor 54 may be an ordinary starting motor as used in starting automobile engines and can be driven from the starting storage bat-

tery used upon automobiles. The motor 54 may be started by closing a switch 62 mounted on the brace members 22. The switch 62 is preferably of the double pole double throw type whereby it may be connected to the field and armature of the motor for running the motor in one direction when the switch is thrown to one position and in a reverse direction when the switch is thrown to another position.

The motor 54 is provided with the usual flange 64 whereby the motor is supported on the crane frame.

Motor mounting eccentrically arranged

The motor 54 is supported upon a bracket B comprising a ring like member 66. The member 66 has an angle shaped base 68 resting against one of the angle side members or uprights 16 which is secured thereto by means of bolts 70. The ring like member 66 has received therein a motor support 72 which is also ring or tubular shaped whereby it may rotate within the member 66. The motor support 72 has a flange portion 74 defining thereby a shoulder on one end and a plate 76 bolted to the other end for properly positioning it within the member 66 to prevent end play therein. Bolts 78 are provided for the purpose of securing the plate 76 to the motor support 72 and are threaded into lugs 80 formed on the motor support. The motor support 72 is free to rotate within its mounting or member 66.

The motor support 72 has formed off center therefrom a flange 80 having an enlarged opening 82. The flange 80 coacts or registers with the flange 64 of the motor and the two flanges 80 and 64 are fastened together by cap screws 84. The motor 54 is thus mounted upon the support 72 and in turn upon the member or bracket 66. A flange 86 on the motor 54 is received within the opening 82 whereby the motor is properly positioned relative to the motor support 72. A cone shaped hub 88 is formed on the motor 54 and extends through an opening 90 formed in the plate 76. The pinion 60 is secured upon the shaft 56 beyond the hub 88 and outside of the plate 76 as clearly illustrated in Figure 4 of the drawings.

The motor mounting is positioned on one of the upright members 16 adjacent the gear wheel 52 whereby the pinion 60 may mesh with the gear wheel 52. It will be noted that the hub 88 or center of the shaft 56 is eccentrically arranged relative to the ring like member 66.

From the foregoing it will be obvious that rotation of the motor support 72 within the drum or ring like member 66 will move the pinion 60 toward or away from the gear wheel 52 whereby the pinion and the gear may mesh or not mesh as desired. Rotation may be im-

parted to the motor support by manipulating a handle 92 formed on the support 72.

Rotation of the motor support 72 within the member 66 is limited by a lug 94 formed on the member 66 which engages either of the shoulders 96 or 98 formed on the flange 80 of the motor support.

For locking the motor support 72 in either of its limited positions I provide a spring actuated locking pin 100, having a knob 102 whereby it may be engaged. The pin 100 extends into an opening 104 formed in the support 72. A spring 106 is mounted on the pin 100 and forces it into the opening 104. An opening 108 is also formed in the support 72 so that the pin 100, when the motor support 72 is rotated to the other of its positions, may fit into. The support 72 may thus be locked in two different positions by the pin 100 fitting into either the opening 104 or 108.

From the foregoing, it will be obvious that in one of the rotated positions of the motor support 72, the pinion 60 will be in mesh with the gear wheel 52. This position is shown in full lines in Figure 1 of the drawings. When the support is in its other position the pinion will be disengaged from the gear as shown in dotted lines in the Figure 1. The disengaged position is also illustrated in dotted lines in Figure 3.

For operating the shaft 50 manually I provide a crank 110 having a hub 112 designed to fit over either end of the shaft 50. The hub 112 is provided with opposite notches 114 which coast with either of the pins 116 extending through the shaft 50. The crank 110 is thus operatively connected to the shaft 50. In using the crane as a hand operated mechanism, the handle 92 is manipulated to disengage the pinion 60 from the gear wheel 52 whereby the motor will not be rotated.

In order to operatively connect the shaft 50 with the drum 51 whereby the chain 38 may be wound thereon or therefrom and to further provide for a direct connection whereby the drum may be operated at high speed or through reduction in gearing the drum may be operated at low speed I provide the following described mechanism.

Secured to one of the end flanges of the drum 51 is an internal gear 118 having inwardly extending teeth 120. It may here be mentioned that the drum 51 is provided with rollers 53 and that the bearings 48 are provided with rollers 49 for providing roller bearings. There are rollers 53 at each end of the drum 51 and they are held in proper spaced position by a sleeve 55. The rollers 49 in the bearings 48 are retained within the bearings by collars 57 pinned to the shaft 50. Received within the internal gear 118 is a gear 122 having teeth 124 thereon meshing with the teeth 120. The gear 122 is mounted eccentrically on the shaft 50 by reason of its being rotatably mounted on an eccentric mem-

ber 126. The eccentric member 126 is secured as by a key 128 to the shaft 50 whereby it rotates in unison therewith. Rollers 130 reduce the friction between the eccentric member 126 and the hub of the gear 122.

The type of gearing just described is a differential reduction and in order that rotation of the shaft 50 may cause rotation of the gear 118 at a reduced speed it is necessary that means be provided for preventing rotation of the gear 122. To prevent rotation of the gear 122 I provide a bell crank lever 132 pivoted on a pin 134 supported by ears 136 extending from the web of the gear 122. The bell crank lever 132 is spring actuated in one direction by a spring 138.

Mounted between the eccentric 126 and the bearing 48 adjacent thereto is a disk 140 having an annular flange 142 near its periphery. The flange 142 extends toward the gear 118 and is shown in section in Figure 8.

The disk 140 is rotatably mounted relative to the shaft 50 and has interposed between its hub and the shaft, rollers 141 for forming a roller bearing. The disk 140 is, however, maintained in fixed position relative to the frame A of the crane mechanism whereby it does not rotate relative to the frame. This is accomplished by the lugs 143 formed integrally with the disk 140 which engage the inwardly extending legs of one of the upright angle members 16.

A boss 144 is provided on the disk 140 and has a shaft 146 rotatably mounted therein. Rotatably mounted on an enlarged portion 148 of the shaft 146 is a roller 150. A flange 152 is secured to the shaft 146 and adjacent the roller 150. The flange 152 overhangs the periphery of the roller 150 whereby the bell crank lever 132 in its full line position shown in Figure 6 is held in engagement with the roller 150 against the action of the spring 138 and thus rotation of the gear 122 is prevented.

To provide for the engagement between the roller 150 and the lever 132 I cut the flange 142 away as at 145 and 147 whereby sufficient space is left between the cut away portion 145 and the roller 150 to allow the lever 132 to be positioned therebetween. The weight of the load on the chain 38 tends to rotate the bell crank lever 132 in one direction to keep it in engagement with the surface of the roller 150.

The flange 152 is provided with a cut away portion 154 whereby when the flange is rotated to the dotted line position illustrated in Figure 8 with the cut away portion 154 parallel with the longitudinal axis of the lever 132, the spring 138 will act to disengage the lever from the roller 150.

Mounted on the shaft 50 and secured as by pins 156 is a disk 158. The pins 156 merely extend through the eccentric member 126 and the disk 158 whereby the eccentric mem-

ber and the disk will rotate in unison with the shaft 50. The disk 158 is provided with notches 160 in its periphery.

When the bell crank lever 132 is free to be actuated by the spring 138 the end 162 thereof will engage the periphery of the disk 158 and when the end 162 registers with a notch 160 it will be received therein due to the spring action on the lever 132.

For rotating the flange 152 to either of the positions whereby the flange does or does not engage the bell crank lever 132 I provide a spool like handle 164 secured to the shaft 146. Slidably mounted in the handle 164 is a spring actuated pin 166 operated by a spring 168. The pin 166 engages holes in the boss 144. When the parts are in one position, the pin 166 engages the hole 170 and when in another position it engages the hole 172 as illustrated in Figure 5 of the drawings.

In the operation of the crane, when a load is being raised, it is desirable to prevent any reverse movement of the winding drum 51 and to guard against this I provide ratchet teeth 174 formed on the gear 118 adjacent the periphery thereof. Integrally formed on the disk 140 is a sectional boss 176 having received therein the shaft 178. Secured to the pin 178 is a pawl 180 for coacting with the ratchet teeth 174. The pawl 180 is yieldingly held in engagement with the teeth by a spring 182 interposed between the pawl and a shoulder 184 formed in the boss 176. A knob 186 is provided for the convenience of the operator for withdrawing the pawl 180 from engagement with the ratchet teeth 174.

The shaft 178 has a pin 188 therein designed to be slidably received in a notch 190 formed in the boss 176 to prevent rotation of the pawl 180. When it is desired to disengage the pawl 180 from the ratchet teeth 174, then the shaft 178 may be withdrawn whereby the pin 188 is clear of the end of the boss 176 and the shaft 178 may then be rotated a quarter turn and the pin 188 allowed to engage the notch 192 for maintaining the pawl disengaged.

Practical operation of my crane mechanism

In the operation of my device through the motor 54 I first move it to one of its positions where the pinion 60 and the gear wheel 52 are in mesh. The motor will then impart rotation to the shaft 50 when the switch 62 is closed. When the switch 62 is thrown to one of its positions it will rotate the shaft 50 in one direction and when thrown to the other of its positions it will rotate the same shaft in an opposite direction. For adjusting the hook 46 to position for engaging the load to be lifted, the handle 164 is rotated to the position where the pin 166 can engage the hole 172. This allows the bell crank lever 132 to assume the dotted line position shown in Figure 6 due to the pressure exerted on

the lever by the spring 138. When the end 162 of the lever 136 engages the periphery of the disk 158, the disk, upon being rotated by the motor 54, will bring one of the notches 160 to register with the end 162 of the lever whereupon the lever drops into the notch. Thereafter the shaft 50, eccentric member 126, disk 158, lever 132, and gear 122 will be operated in unison. Inasmuch as several of the teeth on the gear 122 are in mesh with several of those on the internal gear 118, the drum 51 will also be rotated in unison with the shaft 50. In this manner a direct connection is had between the shaft 50 and the drum 51 and the hook 46 may be quickly adjusted as desired.

During such adjustment of the hook 46, the pawl 180 is moved to position where it is not in engagement with the ratchet teeth 174 on the gear 118 so that the parts of the hoisting mechanism may move freely.

After the load has been engaged and it is desired to raise it, the speed reducing mechanism must be used in order that the motor will have sufficient power for raising the load. The operator moves the handle 164 to position where the pin 166 will be received in the hole 170 and the flange 152 will be in the full line position illustrated in Figure 8. As the shaft 50 is further rotated, and consequently the lever 132 with it, the operator engages the free end of the bell crank lever 132 and moves it against the action of the spring 138. This brings the bell crank lever to engagement with the annular flange 142 and rotation of the shaft 50 brings the lever to position where it registers with the space between the cut away portion 145 and the roller 150. The pressure imposed on the lever by the operator will then cause the lever to assume the full line position illustrated in Figure 6 between the cut away portion and the roller and the lever is thereafter retained against the roller by further rotation of the shaft. When the parts are in this position, the flange 152 prevents action of the spring 138 to disengage the lever from the roller and the end 162 of the lever is disengaged from the notches 160 of the disk 158. Rotation of the shaft 50 now causes an eccentric motion to be transmitted through the eccentric member 126 to the gear 122. This motion is transmitted in turn at a reduced speed to the gear 118 and consequently to the drum 51 whereby the chain 38 may be wound thereon and the load lifted.

As the load is being lifted the knob 148 is rotated and the pin 188 is allowed to enter the slot 190 to cause resilient engagement of the pawl 180 with the teeth 174 whereby the drum cannot rotate in a reverse direction when the motor is stopped.

Hand operation of the device is identical to motor operation thereof except that the motor is moved to position where the pinion

60 is disengaged from the gear wheel 52 and the crank 110 is utilized for rotating the shaft 50.

From the description of my crane mechanism it will be obvious that I have provided an efficient crane which may be motor driven and wherein mechanism is provided for operating the winding drum at high or low speed whereby a minimum of time is expended in the operation of the crane. I have designed the parts of my mechanism whereby a standard starting motor may be utilized for operating the crane so that no additional storage battery must be carried by the wrecking car.

Some changes may be made in the construction and arrangement of the various parts of my invention, without departing from the real spirit and purpose of my invention, and it is my intention to cover by my claims any modified forms of structure or use of mechanical equivalents, which may be reasonably included within their scope.

I claim as my invention:

1. In combination with a gear to be driven, a motor having a pinion for coaction with said gear and a mounting for said motor comprising a bracket, a rotatably mounted drum therein, one end of said drum having a head provided with an opening, said motor having a hub to fit through said opening, a removable head on the other end of said drum for retaining the same against longitudinal movement with respect to said bracket, said removable head having an opening for said hub of said motor to fit therethrough, said openings being eccentrically arranged with respect to the periphery of said drum whereby rotation of the drum will cause selective engagement and disengagement of said pinion with respect to said gear.

2. In combination with a gear to be driven, a motor having a pinion for coaction with said gear and a mounting for said motor comprising a bracket, a rotatably mounted drum therein, one end of said drum having a head provided with an opening, said motor having a hub to fit through said opening and a flange, means for securing said flange to said drum head, a removable head on the other end of said drum for retaining the same against longitudinal movement with respect to said bracket, said removable head having an opening for said hub of said motor to fit therethrough, said openings being eccentrically arranged with respect to the periphery of said drum whereby rotation of the drum will cause selective engagement and disengagement of said pinion with respect to said gear.

3. In combination with a gear to be driven, a motor having a pinion for coaction with said gear and a mounting for said motor comprising a bracket, a rotatably mounted drum therein, one end of said drum having a head

provided with an opening, said motor having a hub to fit through said opening, a removable head on the other end of said drum for retaining the same against longitudinal movement with respect to said bracket, said removable head having an opening for said hub of said motor to fit therethrough, said openings being eccentrically arranged with respect to the periphery of said drum whereby rotation of the drum will cause selective engagement and disengagement of said pinion with respect to said gear, a handle on said drum for rotating the same and locking means for retaining the drum in selected position.

Des Moines, Iowa, Nov. 6, 1926.

LEONARD D. NILSON.