June 14, 1960 J. L. BONANNO 2,940,607

TOY CRANES

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Fig. 1.

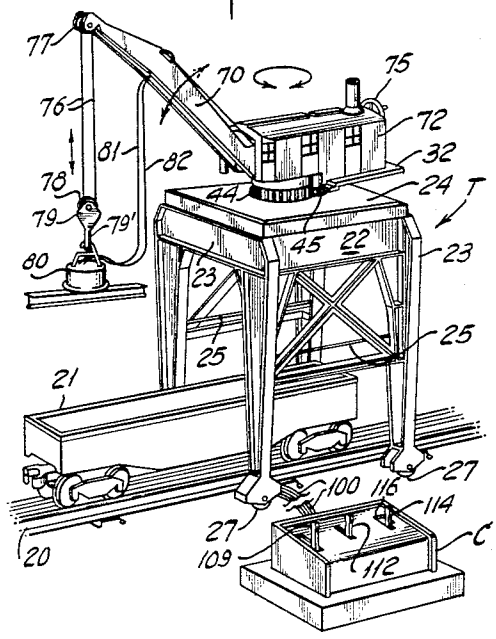


Fig. 4.

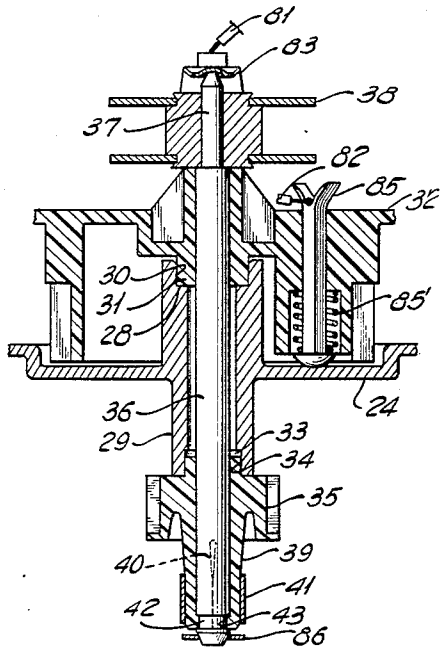
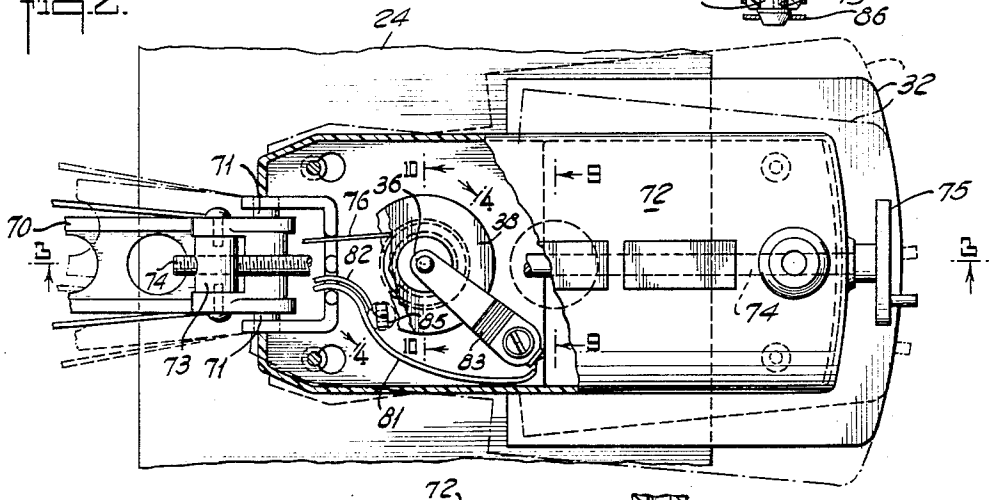


Fig. 2.



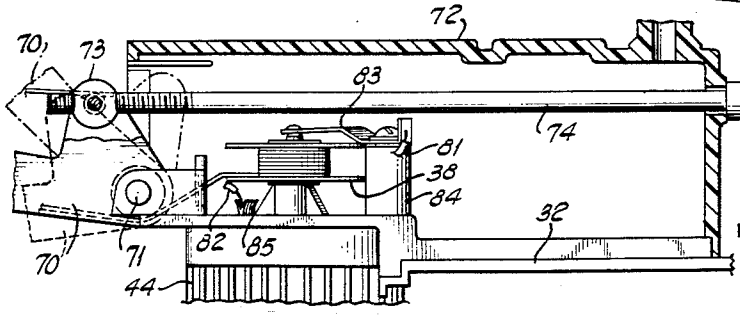


Fig. 3.

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Fig. 5.

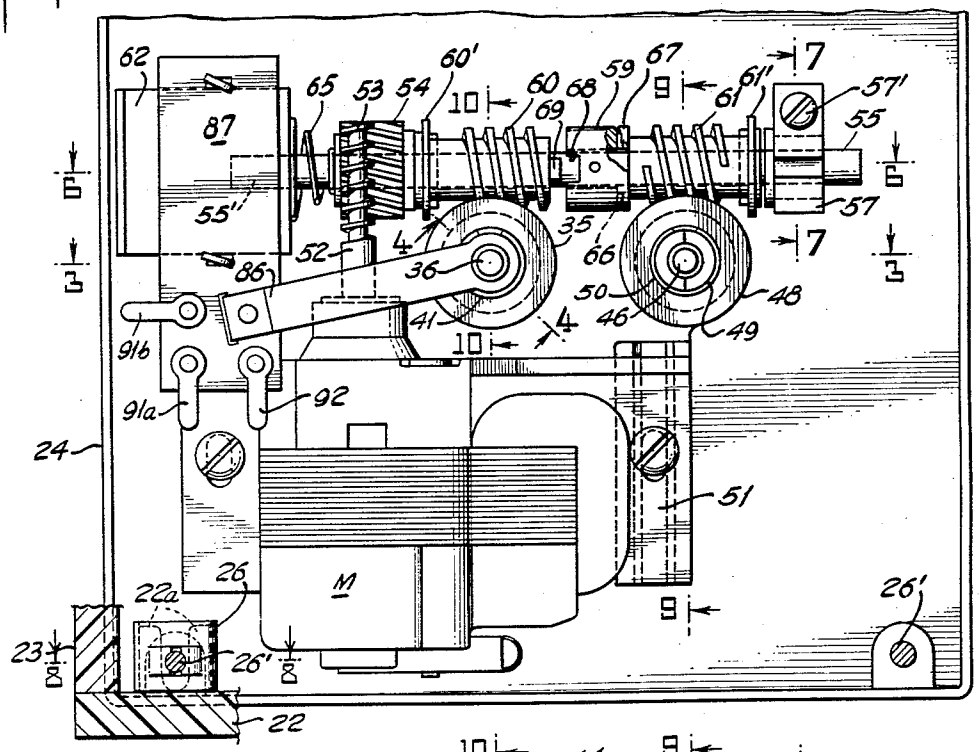


Fig. 6.

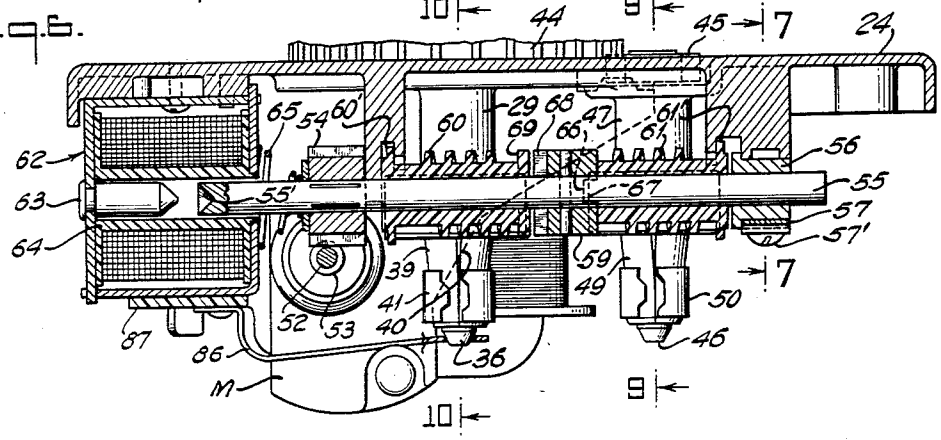


Fig. 7.

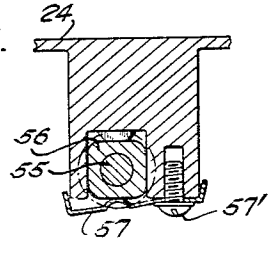
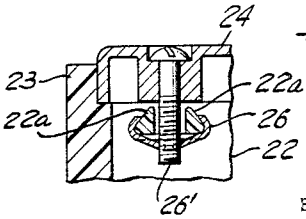


Fig. 8.



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Fig. 9.

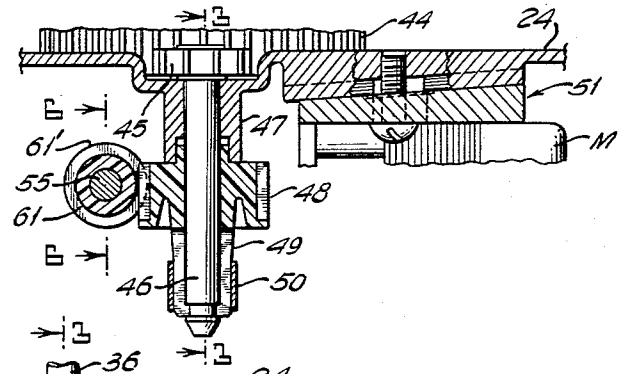


Fig. 10.

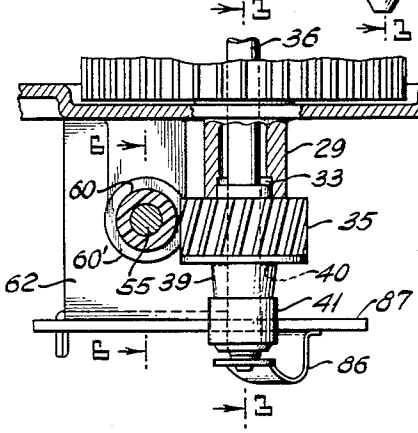


Fig. 11.

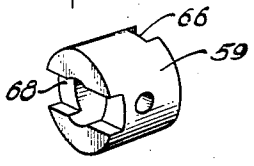
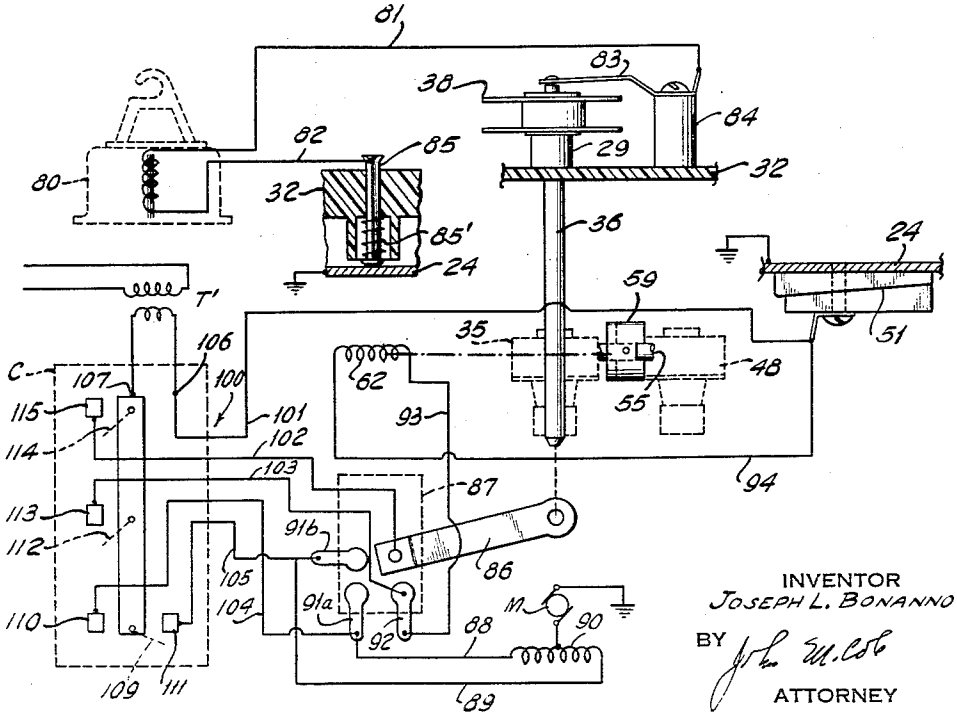


Fig. 12.



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United States Patent Office 2,940,607 Patented June 14, 1960

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TOY CRANES

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Filed Nov. 10, 1955, Ser. No. 546,110

7 Claims. (Cl. 212—41)

The present invention relates to toy cranes.

In industrial operations it is common to employ power operated cranes to hoist and move articles. Railroads often use them in the loading and unloading of railway cars, the freight being lifted from a loaded vehicle, or ship, or the ground and put on the car or lifted up from the car and placed on a ship, vehicle or on the ground.

The present invention contemplates a toy crane suitable for use with toy railroads in the loading and unloading of toy freight, as well as handling toy loads in other locations. Accordingly the crane structure includes a rotatable cab, which may simulate the cab found on a diesel or electric crane, a cab carried lifting boom, tackle and magnet, a reversible electric motor with suitable driving connections to turn the cab about a vertical axis and raise and lower the lifting tackle, and a clutch, preferably remotely controlled so that one or the other of the driving connections from the motor may be operated in a selected direction.

The invention also contemplates the provision of a remote controller with suitable switches to effect the operation of the motor in either direction, the operation of the clutch, and the energization of a lifting magnet carried by the lifting tackle.

Other and further objects of the invention will be apparent as the description proceeds.

The accompanying drawings show, for purposes of illustrating the present invention, one embodiment in which the invention may take form, it being understood that the drawings are illustrative of the invention rather than limiting the same.

In the accompanying drawings:

Figure 1 is a perspective view showing the crane in use for loading or unloading a toy car;

Figure 2 is a top plan view of the crane with portions of the support broken away and portions of the cab broken away to show interior construction, parts being in section;

Figure 3 is a sectional view on the line 3—3 of Figs. 2 and 5, showing the cab and boom hoist;

Figure 4 is a vertical sectional view taken on the line 4—4 of Figures 2 and 5, illustrating the pivoting of the cab and the drive for the hoisting drum;

Figure 5 is an inverted plan view taken in the direction of the arrow 5 of Fig. 6, illustrating the operating mechanism under the cab supporting plate;

Figure 6 is a vertical section on the line 6—6 of Figures 5, 9 and 10, looking in the direction of the arrows;

Figure 7 is a fragmentary section taken on the line 7—7 of Fig. 6;

Figure 8 is a fragmentary section taken on the line 8—8 of Fig. 5 showing the securement of the base plate to the tower structure;

Figure 9 is a vertical, sectional view on the line 9—9 of Figs. 2, 5 and 6, illustrating the drive mechanism for turning the cab;

Figure 10 is a fragmentary, vertical section taken on the line 10—10 of Figs. 5 and 6, illustrating the driving mechanism for the hoisting drum;

Figure 11 is a perspective view of the clutch member; and

Figure 12 is a wiring diagram.

In the drawings a conventional toy track is illustrated at 20 and a toy railroad car at 21. A four-sided tower T, made up of two side panels 22, 22 and two end panels 23, 23 is employed to support the die cast base plate 24 on which the operating mechanism of the crane is carried. The four tower forming members are in the form of plastic moldings with suitable recesses and projections (not shown) to facilitate interlocking and aligning them. They are tied together by the tie rods 25, 25 which extend from one end member to the other. The side members 22, 22 are provided with lugs 22*a*, 22*a*, Figs. 5 and 8, to receive metal clips 26 threaded for cooperation with screws 26' which pass down through the base plate. Wheels 27 on the feet of the tower facilitate rolling it along a track or other support.

Base plate 24 has, as clearly shown in Fig. 4, upwardly and downwardly extending bosses 28 and 29. The upper boss 28 is counterbored as indicated at 30 to form a bearing for the central hub 31 of a cab platform member 32 made of molded plastic. The lower boss 29 is counterbored, as indicated at 33 to receive the reduced end 34 of a worm wheel 35, preferably made of molded nylon. The cab platform 32 and worm wheel 35 carry a vertical metal shaft 36 which extends above the cab platform member, as indicated at 37 and is drivingly connected with a winding drum 38. In order to limit the driving torque between the worm wheel 35 and the shaft 36, the worm wheel 35 has a hub portion 39 slitted as indicated at 40, and it is surrounded by a strong, resilient metal clamping ring 41 which tends to close the slitted hub against the shaft. To secure the worm wheel against accidental removal from the shaft, the shaft is undercut as indicated at 42 and the hub has a flange 43 extending into this undercut.

The cab platform 32 has a large gear 44 in mesh with a pinion 45, see Figs. 6 and 9. This pinion is carried on a shaft 46 which extends down through a boss 47 forming part of the base plate 24. This shaft receives a second worm wheel 48 identical with the worm wheel 35 and having slitted hub 49 carrying clamping spring 50, and otherwise secured to the shaft in the same manner as the worm wheel 35.

A reversible electric motor, generally marked M in the drawings, is secured underneath the base plate 24 as shown at 51, 51 so that its spacing below the base plate may be adjusted. The armature shaft 52 of the motor carries a worm 53 which bears on a worm wheel 54 carried by a horizontal shaft 55 so as to drive this shaft. The right hand end of this shaft, as shown in the drawings, is mounted in a bearing 56 held in place by a spring 57 and screw 57'. The worm 53 holds the shaft 55 in the recess 58 of lug 58'.

The shaft 55 is provided with a clutch member 59, shown more in detail in Fig. 11. This clutch member is between two worms 60 and 61, loosely carried on shaft 55. Worm 60 is in mesh with the worm wheel 35 and the worm 61 is in mesh with the worm wheel 48. The worms 60 and 61 have flanges 60' and 61' which enter into slotted lugs 60'' and 61'' carried by the base 24.

The base also supports a solenoid coil or electromagnet generally indicated at 62, coaxial with the horizontal shaft 55. This electromagnet has a pole piece, indicated at 63, and the left end 55' of the shaft 55 enters into the spool 64 on which the coil of the electromagnet is wound and forms an armature for the electromagnet. A coiled spring 65 between the worm wheel 53 and the magnet structure urges the shaft 55 to the right.

When the shaft **55** is in the right hand position as in Figs. 5 and 6 of the drawings, notches **66** on the clutch member **59** receive projections **67** formed in the worm **61** so that the motor is normally connected for driving the shaft **46** one way or the other and turning the cab platform in a corresponding direction. When the magnet **62** is energized the shaft **55** is pulled to the left and the notches **68** in the left face of the clutch **59** receive the projections **69** on the worm **60**. At this time the motor drive is to the worm wheel **35** and winding drum **38** instead of to the cab turning shaft.

At the left end of the cab platform, as shown in the drawings, a lifting boom **70** is pivoted as indicated at **71**. The platform is covered by a cab **72**. To maintain the boom in adjusted position it is provided with a boom elevating nut **73** which receives a boom elevating screw or rod **74** having a hand wheel **75** at the further end of the cab.

The winding drum **38** receives a hoisting cord **76** which extends about a boom carried pulley **77**, a hanging pulley **78** carrying a pulley block **79** with hook **79'**. The other end of the cord is anchored to the boom. The pulley hook **79'** carries a lifting magnet **80** having wires **81** and **82** which extend up to the boom and pass down along it. The wire **81** is connected to a spring **83** anchored on a post **84** forming part of the cab platform and extending over onto the upper end of the shaft **36**, as indicated more clearly in Fig. 4. The other wire **82** from the lifting magnet is connected to a contact pin **85** carried by the cab platform **32** and extending down through the same so as to be pressed against the base **24** by spring **85'**, as shown in Fig. 4. The lower end of the drum shaft **36** receives a contact forming leaf spring **86** which is anchored to a terminal plate **87** secured to the housing for the electromagnet **62**.

The motor armature is grounded to the base **24**, as indicated in Fig. 12 and the ends of its field windings **90** are connected by wires **88** and **89** with terminals **91***a* and **91***b* on the terminal plate **87**. The solenoid coil **62** is connected to a terminal **92** carried by the terminal plate **87** by wire **93** and is grounded by wire **94**.

It will thus be seen that the motor, the lifting magnet and the clutch shifting magnet are grounded and have connections to the terminals carried by the terminal plate **87**.

The structure so far described is an independent unit which can be placed on any suitable support, as for example, in position to straddle the railroad track as in Fig. 1. In order to control the crane, it is preferably permanently connected by a multi-conductor cable **100** having a first conductor **101** grounded to the base plate, a second conductor **102** connected to the spring **87** which supplies current to the lifting magnet, a conductor **103** connected to the electromagnet **62** and conductors **104** and **105** connected to the terminals **91***a* and **91***b* which supply current to the motor field coil **90**.

The control C is indicated structurally in Fig. 1 and diagrammatically in Fig. 10. It has terminals **106** and **107** adapted to be connected to the low voltage side of a transformer T'. The terminal **106** is connected to the conductor **101** so as to connect the side of the transformer to all of the work circuits. The terminal **107** is connected to the conducting strap **108** which carries three switch arms biased to a neutral position. The switch arm **109** is shiftable back and forth between contacts **110** and **111**, connected by conductors **104** and **105** with the motor field so as to operate the motor in one direction or the other and drive the horizontal shaft **55** accordingly. The switch arm **112** cooperates with contact **113** connected by wires **103** and **93** with the solenoid coil **62** so that when this circuit is closed the clutch **59** is shifted to engage the worm wheel driving the winding drum shaft.

The switch arm **114** cooperates with contact **115** connected through wire **102** and the internal wiring on the

crane structure to energize the lifting magnet. It is preferably biased to enter the wide portion **116** of the notch in the controller cover through which arm **114** projects so that it retains the magnet circuit closed. The operator then has the hands free to manipulate the lifting lever and reversing lever.

The slip connections between the vertical shafts and the driving gears make it possible to limit the amount of torque which can be transmitted in either direction through the drives. For example, the slip clutch associated with shaft **36** makes it possible for slippage to take place should the pulleys **78** and **79** be brought together to stop further winding of the cord. The slippage provided in the drive for the cab platform makes it possible to manually shift the cab platform into a desired position even when the device is disconnected from the source of power.

Since it is obvious that the invention may be embodied in other forms and constructions within the scope of the claims, I wish it to be understood that the particular form shown in but one of these forms, and various modifications and changes being possible, I do not otherwise limit myself in any way with respect thereto.

What is claimed is:

1. A crane comprising a mounting platform, a cab, a boom pivotally mounted on said cab, material-lifting means, a cable winding-drum on said cab, cable means connecting said material-lifting means and said cable winding-drum in a position to suspend said material-lifting means from said boom, a first upstanding hollow boss formed on said mounting platform, said cab being pivotally mounted on said first boss, a first shaft extending into and rotatably supported on said first boss, said winding-drum being affixed to said first shaft for rotation therewith, a second hollow boss formed in said mounting platform, a second shaft extending into and rotatably supported in said second boss, means connecting said second shaft and said cab to rotate said cab in response to rotation of said second shaft, a first gear affixed to said second shaft, first and second hollow sleeve members adjacent said first and second shafts each having a clutch gear affixed thereto, said second hollow sleeve clutch gear being in constant engagement with said first gear, a second gear on said first shaft, said first hollow sleeve clutch gear being movable into and out of engagement with said second gear and said first hollow sleeve being movable into and out of engagement with said second hollow sleeve, drive means to continuously rotate said first sleeve, rod means slidable in each of said hollow sleeve members and rotatably supporting said members, clutch means between said first and said second hollow sleeve members and connected to said rod means, and means to shift said rod to alternately engage one of said first and second hollow sleeve members.

2. A crane according to claim 1 wherein said platform is positioned on elongated leg supports.

3. A crane according to claim 1 having wheeled supporting legs connected to said platform adapted to span a track structure and position said crane thereover.

4. A crane according to claim 1 including handle means to raise and lower said boom.

5. A crane according to claim 1 wherein said material lifting means is a magnetic pick-up mechanism, and means for selectively energizing said mechanism.

6. A crane according to claim 5 including a ground contact member on said cab biased downwardly therefrom into contact with said platform, said contact member being connected to said magnetic pick-up mechanism.

7. A crane according to claim 1 including electric control means to shift said rod and effect selective operation of said cable winding drum and said cab rotating means.

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