Nov. 11, 1930. A. E. HOGREBE 1,781,281

CRANE TROLLEY

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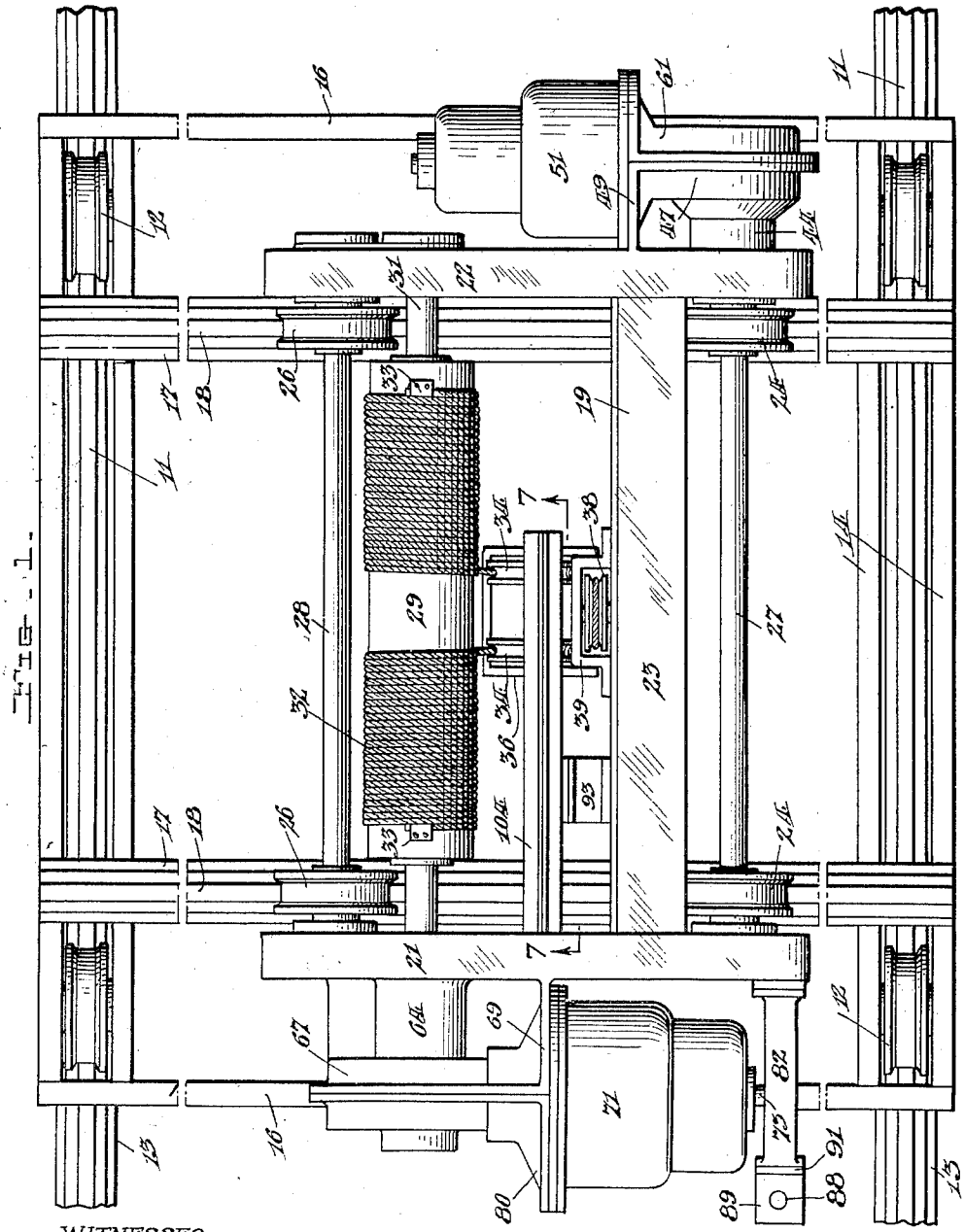


Fig. 1.

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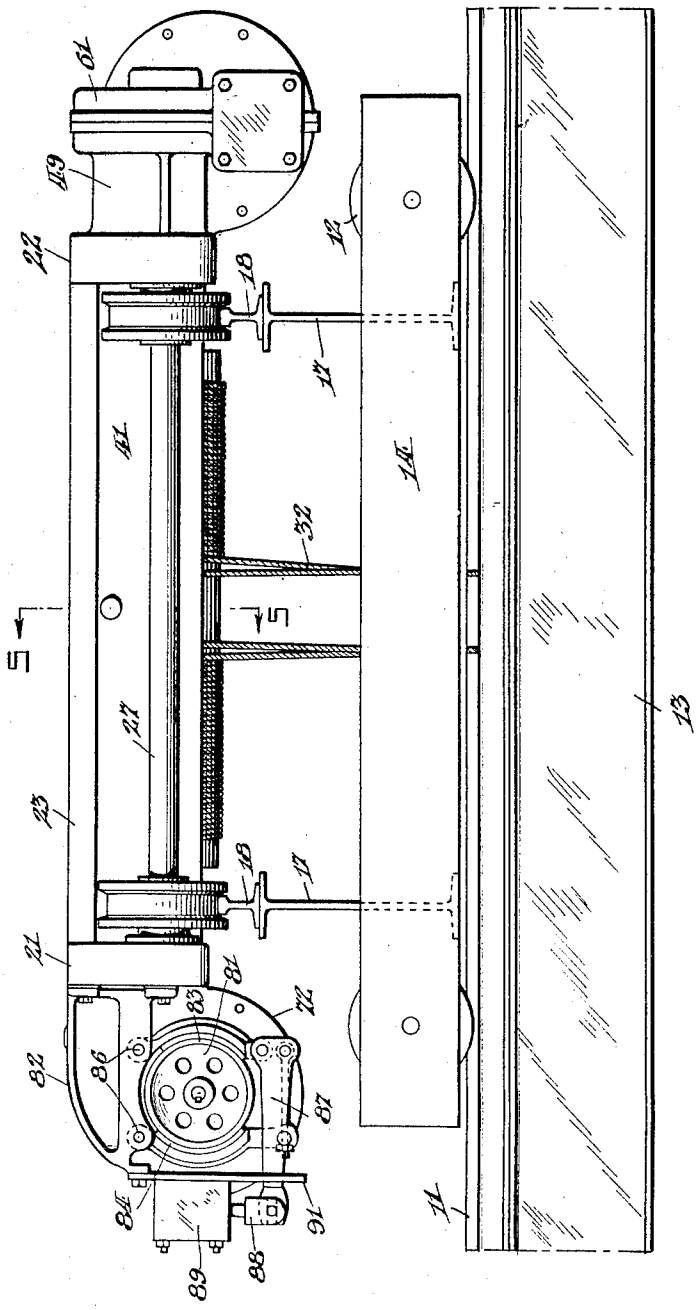
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CRANE TROLLEY

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Fig. 2



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CRANE TROLLEY

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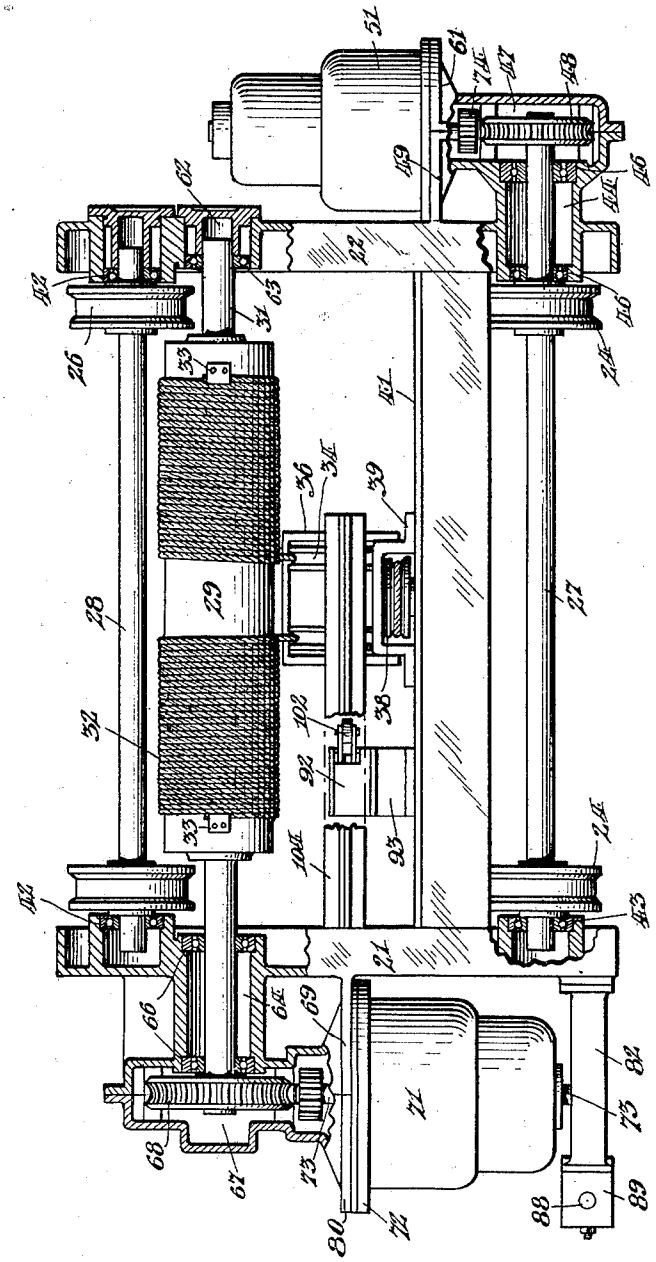


Fig. 3.

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CRANE TROLLEY

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FIG. 4.

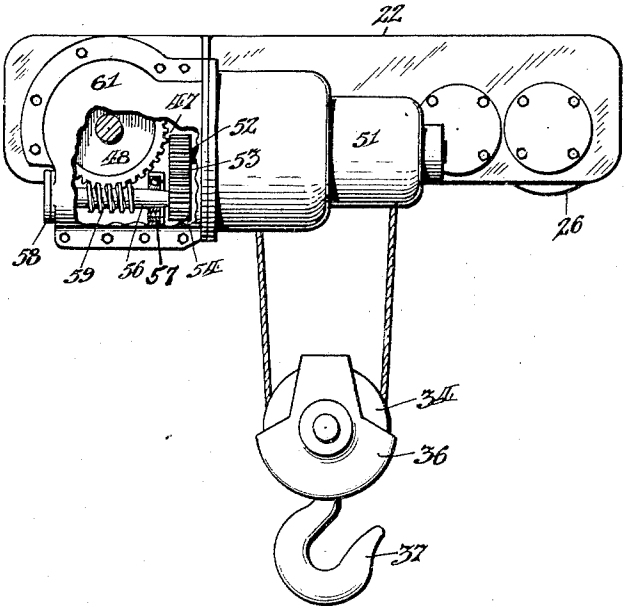
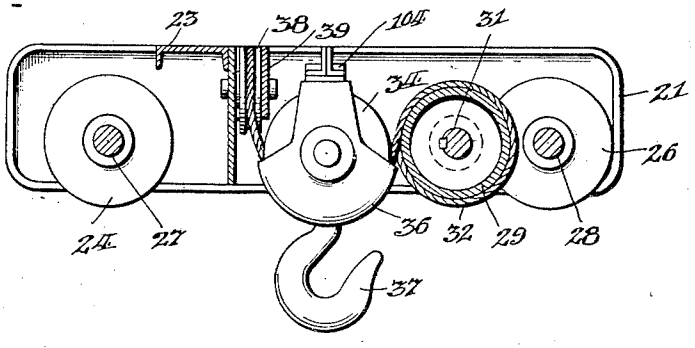


FIG. 5.



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CRANE TROLLEY

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FIG. 6.

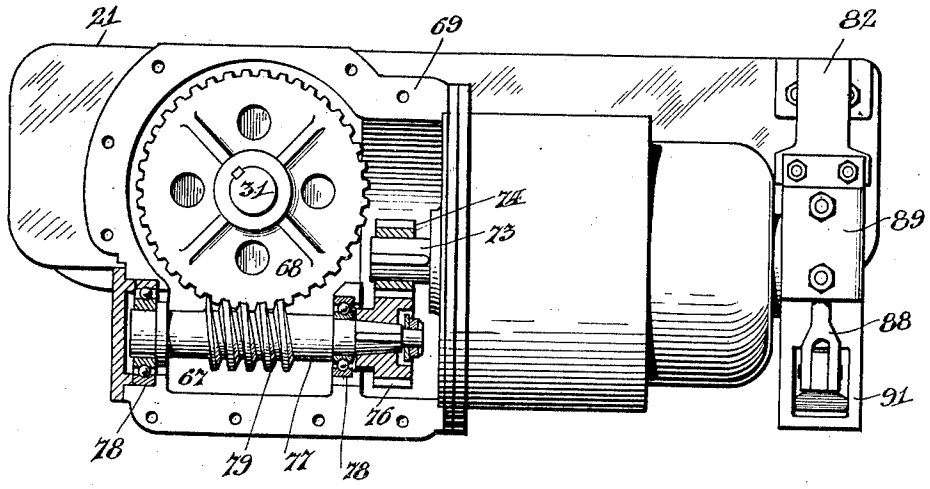
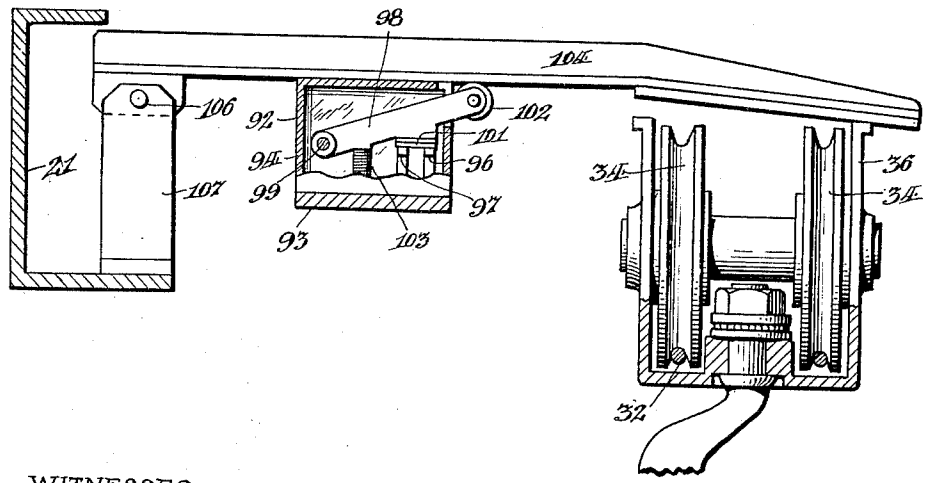


FIG. 7.



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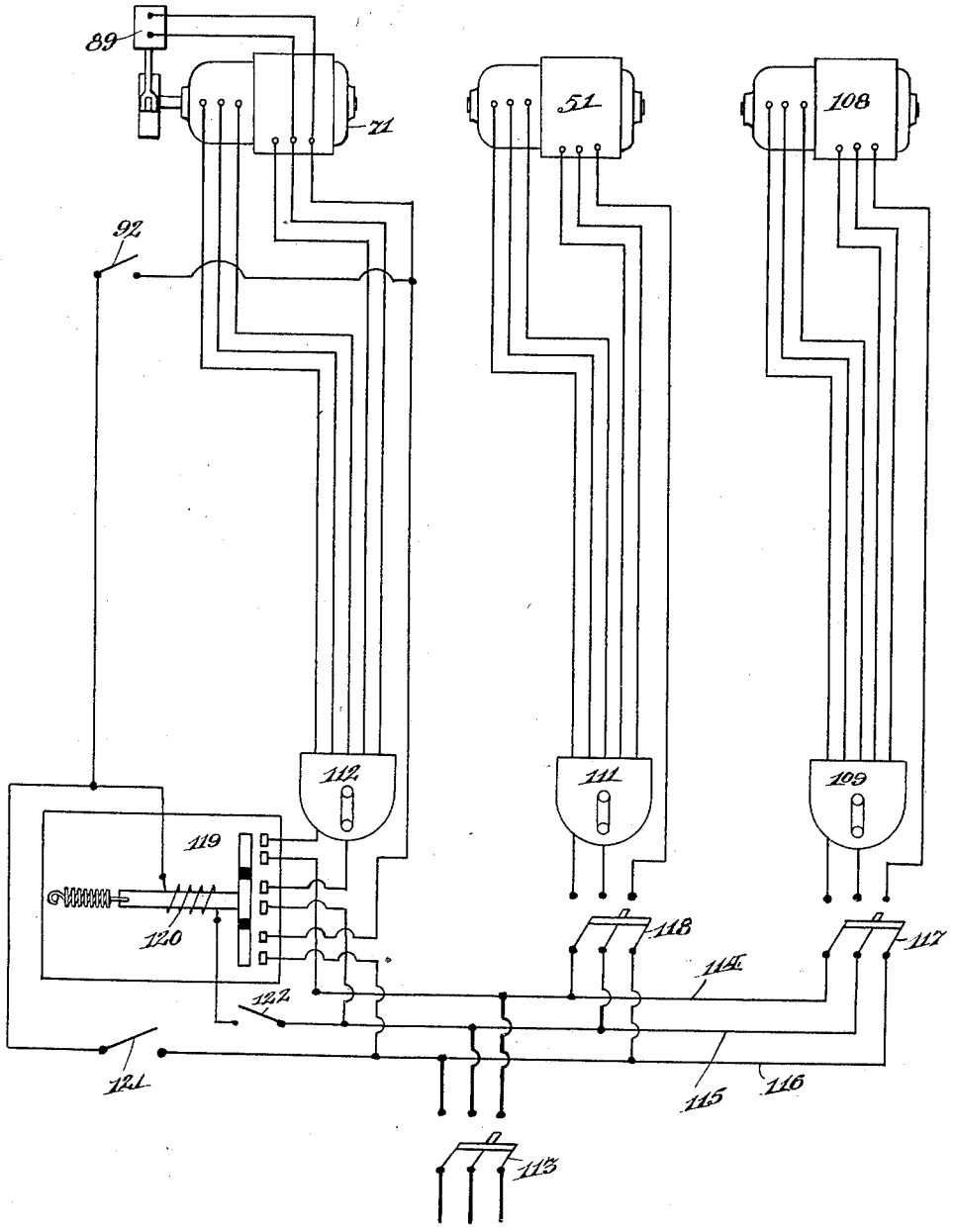
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CRANE TROLLEY

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FIG. 8.



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UNITED STATES PATENT OFFICE

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CRANE TROLLEY

Application filed July 6, 1928. Serial No. 290,776.

This invention relates to traveling cranes and has particular reference to the trolleys which travel thereon for lifting and moving weighty articles.

One of the objects of the invention is to provide an improved crane trolley.

Another object of the invention is to provide a crane trolley whose parts are so arranged that it will have a greater traverse movement.

Another object of the invention is to provide a trolley so constructed that it may be mounted closer to the roof of a building in order to permit loads to be lifted to greater heights.

Still another object of the invention is to provide a crane trolley whose motors are so positioned as to permit the bridge to be moved to the outermost limit of its supporting rails.

According to the invention, the crane trolley is arranged with side frames and connecting means between the same, the side frames having integral extensions for mounting a hoist motor parallel with one of the frames and a traverse motor parallel with the other frame, said extensions being so arranged that the motors are below the tops of said frames.

The side frames may be provided with integral bearings for supporting the traction wheel shafts and with integral bearings for supporting the hoist drum shaft. The mechanism for operating the traction wheels and the hoist drum may also be mounted and connected with the respective motors in integral housings formed on said side frames.

The drawings illustrate an embodiment of the invention and the views therein are as follows:

Figure 1 is a top plan view, partly broken away, of a traveling crane having a trolley constructed according to my invention,

Figure 2 an end view thereof,

Figure 3 a top plan view of the trolley with certain parts broken away,

Figure 4 is an elevation of the traction drive side of the trolley, the gear case cover being broken open,

Figure 5 is a cross-section taken on the line 5—5 of Figure 2 but showing the block in raised position,

Figure 6 is an enlarged elevation of the hoist drive side of the trolley, the gear case cover being omitted,

Figure 7 an enlarged fragmentary cross-section taken on the line 7—7 of Figure 1 but showing the block in raised position and the casing of the limit switch broken open, and

Figure 8 a wiring diagram showing the connections between the several motors, brake release solenoid and limit switch.

Figure 1 illustrates the manner in which the bridge is mounted on the bridge tracks 11 through the wheels 12 which are located near the corners of the bridge and, as shown, are mounted between the tie beams 14. The outer ends of the tie beams are fastened together between the two tracks 11 by a side beam 16 at each end thereof.

The bridge tracks are ordinarily mounted on suitable girders or I beams 13 which are supported along the sidewalls of the building.

Parallel with the side beams 16 and within the space enclosed between the same are rail supporting beams 17, upon which are mounted trolley tracks 18.

The bridge here shown is in skeleton form, the driving motor for the same and other mechanism having been omitted as the invention herein refers particularly to the trolley and only such parts of the other apparatus as are necessary for the explanation of the invention have been shown.

The trolley, which is generally designated as 19, is provided with side frames 21 and 22 which are connected by means of the intermediate channel member 23. The trolley is also provided with traction wheels, two of the same characterized by the numeral 24 being the driven wheels, and the other two designated as 26 being idle wheels. Each pair of wheels is mounted on an axle 27 and 28, respectively.

The trolley is also provided with a hoist drum 29 which has a shaft 31 extending through the same and this drum is located

between the axles 27 and 28 and nearer to the latter.

The drum 29 is provided with a cable 32, the ends of which are fastened by means of clamps 33 to said drum and said cable passes downward under sheave wheels 34 rotatably mounted in the block 36 to which the hook 37 is attached, and thence upward and over an equalizing pulley 38 which is mounted between the bracket 39 and a plate 41 which is secured to the channel 23.

The idle wheels 26 of the trolley are secured to the axle 28 and the ends of the axle pass into bearing housings which are integrally formed in the side frames 21 and 22 and which are provided with ball bearings 42.

The traction wheels 24 are also securely mounted on the axle 27 and one end of the same passes into a bearing housing in the side frame 21 which is provided with a suitable ball bearing 43, while the other end of said axle extends through a bearing housing 44, in the side frame 22, provided with two ball bearings 46 and into a gear housing 47. This end of the axle is provided with a worm wheel 48.

Referring now to Figures 2, 3 and 4, the side frame 22 is also provided with an extension 49 to which a traverse motor 51 is fastened.

The shaft 52 of this motor is provided on its one end with a pinion 53 which meshes with a pinion 54 fastened to the end of a shaft 56 which is located in the housing 47 and which rotates in the ball bearing 57 and in a similar ball bearing located within the cover 58.

The shaft 56 is provided with a worm 59 which meshes with the worm wheel 48 on the end of the axle 27 so that the traction wheels 24 are rotated through the medium of the motor shaft 52, the pinion 53 meshing with the pinion 54 on the shaft 56, and the worm 59 meshing with the worm wheel 48.

The gear housing 47 is provided with a cover 61 which completely encloses said gear mechanism and the one end of the traverse motor 51.

One end of the shaft 31 of the hoist drum 29 extends into a bearing housing 62 in the side frame 22 where it is provided with ball bearings 63 and the other end of said shaft extends into a bearing housing 64 formed integral with the side frame 21 and said housing is provided with a pair of ball bearings 66 while the outer end of said shaft extends into the gear housing 67 and is provided, on its outer end, with a worm wheel 68.

Referring now to Figures 1, 3 and 6, the side frame 21 is provided with an integral extension 69 to which a motor 71 is connected by the flange 72. The end of the motor shaft 73, which extends into the gear housing 67, is provided with a pinion 74 which meshes with a pinion 76 on the inner end of a shaft 77. This shaft is suitably mounted in the ball bearings 78 and is provided with a worm 79 which meshes with worm wheel 68 on the end of the shaft 31 of the hoist drum 29. The gear housing is provided with a cover 80 for enclosing the mechanism and the open end of motor 71.

The outer end of the shaft 73 of the motor 71 is provided with a friction drum 81 while the side frame 21 has a bracket 82 secured thereto, said bracket having brake bands 83 and 84 pivotally connected thereto at the points 86, the bottom ends of said bands being connected to a spreading mechanism 87, the outer end of which connects to a vertical plunger 88 which extends upward into a solenoid 89, said solenoid being fastened to a plate 91 connected to the bracket 82.

In order to limit the height at which the block may be raised so that the same will not strike the equalizing pulley 38, a limit switch 92 is mounted on a bracket 93 which in turn is mounted on the plate 41 connected to the channel 23.

This limit switch consists of a casing 94 containing fixed contacts 96 and 97. A contact lever 98, hinged at 99 in the casing and carrying a contact 101, is adapted to bridge the contacts 96 and 97.

The outer end of the contact lever is provided with an idle roller 102 and this roller is normally held in a raised position so as to prevent contact between the contact 101 and the contacts 96 and 97 by means of a compression spring 103.

A limit switch operating arm 104 which normally overhangs and bears upon the roller 102 of the lever 98 so as to cause the contact 101 to bridge the contacts 96 and 97 is pivotally mounted at 106 to a bracket 107 mounted on the side frame 21. This arm 104 is adapted to be engaged by the block 36 when the same reaches its uppermost position and as the said arm is raised, the compression spring 103 will swing the lever 98 upward on its pivoted point 99 so that the contact 101 will be drawn upwardly from the contacts 96 and 97, therefore breaking the electric circuit.

During the normal operation of the hoist, the plunger 88 of the solenoid is in its raised position owing to the energization of said solenoid but when the block 36 reaches its uppermost position and operates the limit switch 92, said plunger will fall and permit the brake bands 83 and 84 to frictionally engage the brake drum to stop the motor 71, as later explained in connection with Figure 8.

Figure 8 is a wiring diagram showing the method in which the several motors of the crane, the limit switch, the brake release solenoid, and the automatic switch are connected.

In this wiring diagram, the bridge motor which has been excluded from the showing

in the other views is designated by the numeral 108. The bridge motor 108, the traverse motor 51 and the hoist drum motor 71 are each of the A. C. three phase type. 109, 111 and 112 designate the controllers for the motors 108, 51 and 71, respectively.

113 represents a main switch from a source of three phase alternating current and is connected to the three wires 114, 115 and 116. These wires extend to a three pole-single throw switch 117 in the bridge motor circuit so that when said switch is closed, this motor may be operated through the controller 109.

The wires 114, 115 and 116 are also connected with a three pole-single throw switch 118 which, when closed, permits the traverse motor 51 to be operated through the controller 111.

119 represents generally an automatic switch in which, at 120, is a relay coil for operating the same. The automatic switch 119 is controlled by the limit switch 92 and when the same is closed, the relay will be energized so that the three phases of the lines 114, 115 and 116, which are controlled thereby, will be closed and the hoist drum motor 71 then may be operated through the control 112.

However, if the limit switch 92 has been opened by the raising of the block to its highermost position, as before explained, then the relay will be de-energized and the wires constituting the three phases to the hoist motor will be opened.

In order to operate the hoist motor, it will then be necessary to close the shunt switch 121 which will energize the relay coil 120 so as to close the contacts of the three phases leading to the motor 71.

An auxiliary switch 122 is provided for opening the hoist motor circuit quickly, if desired, by de-energizing the relay coil 120.

The solenoid 89 is energized through wires which extend across a single phase of the field winding of the motor 71 and upon the opening of the limit switch 92 and the deenergizing of the relay 120, the automatic switch will be opened and the solenoid de-energized so as to permit the brake bands 83 and 84 to frictionally grip the brake drum 81 and thereby stop the motor 71.

During the ordinary operation of the motor 71, and when the limit switch 92 is closed, the switch 121 will be opened as the connection is made through the switch 122.

By reason of the location of the hoisting and traverse mechanisms, the hook 37 may be raised to the highest possible position, as there are no overhead obstructions on the trolley. Figures 3 and 5 illustrate this principle.

For the same reason the trolley is made much more compact and narrower which permits of a greater hook approach toward the side walls of the building.

Both of these features permit a greater utilization of space in a building, and therefore its employment virtually adds to the available cubical capacity of the building.

With the arrangement of the trolley side frames as described, the motors for the traverse of the trolley and for the hoisting drum are so positioned that no part thereof extends above the top of the side frames which allows the trolley to travel in close proximity with the ceiling of the building in which the crane is operated.

The location of the motors above the side beams 16 also permit the motors to extend beyond the limit of travel of the bridge so that the hoist may be used in portions of the building and against the walls thereof, hitherto inaccessible to the same.

The crane trolley herein illustrated may be modified in various ways without departing from the invention herein set forth and hereafter claimed.

The invention is hereby claimed as follows:

1. A crane trolley having side frames, means on one of said frames for supporting a traverse motor longitudinally parallel thereto and below the top of said frames, bearing housings on said frames for supporting a hoist drum shaft, means for supporting a hoist motor on the other frame and longitudinally parallel to said frames, and a housing on said last frame for housing gear means and mechanism for connecting said means to said hoist motor, the mechanism between the means and motor being so arranged that the motor may be mounted below the top of the side frames.

2. A crane trolley having side frames, means on one of said frames for supporting a traverse motor longitudinally parallel thereto and below the top of said frames, bearing housings on said frames for supporting a hoist drum shaft, means for supporting a hoist motor on the other frame and longitudinally parallel to said frames, and a housing on said last frame for housing a worm wheel and mechanism for connecting said wheel to said motor, the mechanism between the worm wheel and motor being so arranged that the motor may be mounted below the top of the side frame.

In testimony whereof I have signed my name to this specification.

ARTHUR E. HOGREBE.