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W. C. HEINLE

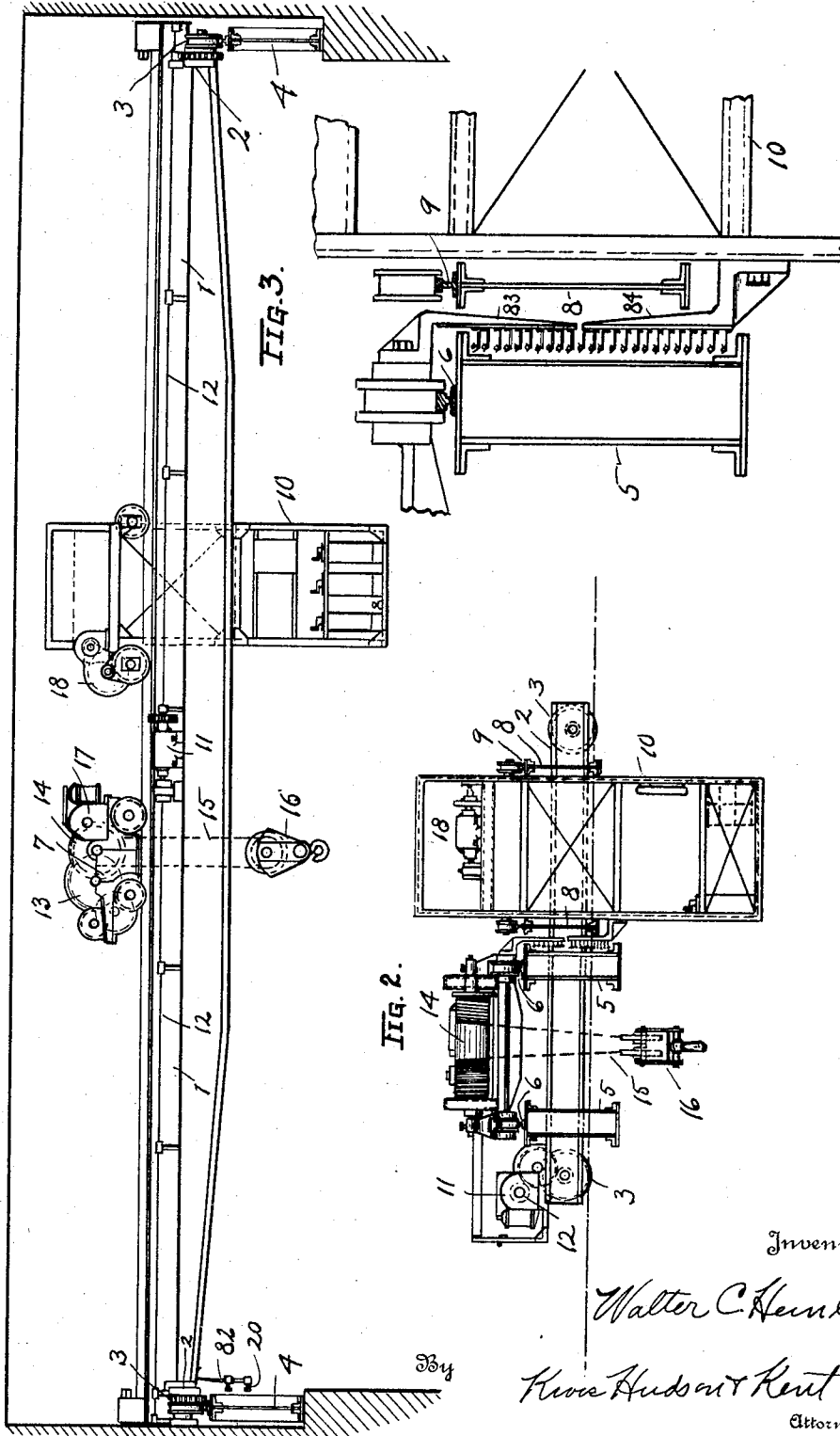
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CRANE

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2 Sheets-Sheet 1

FIG. 1.



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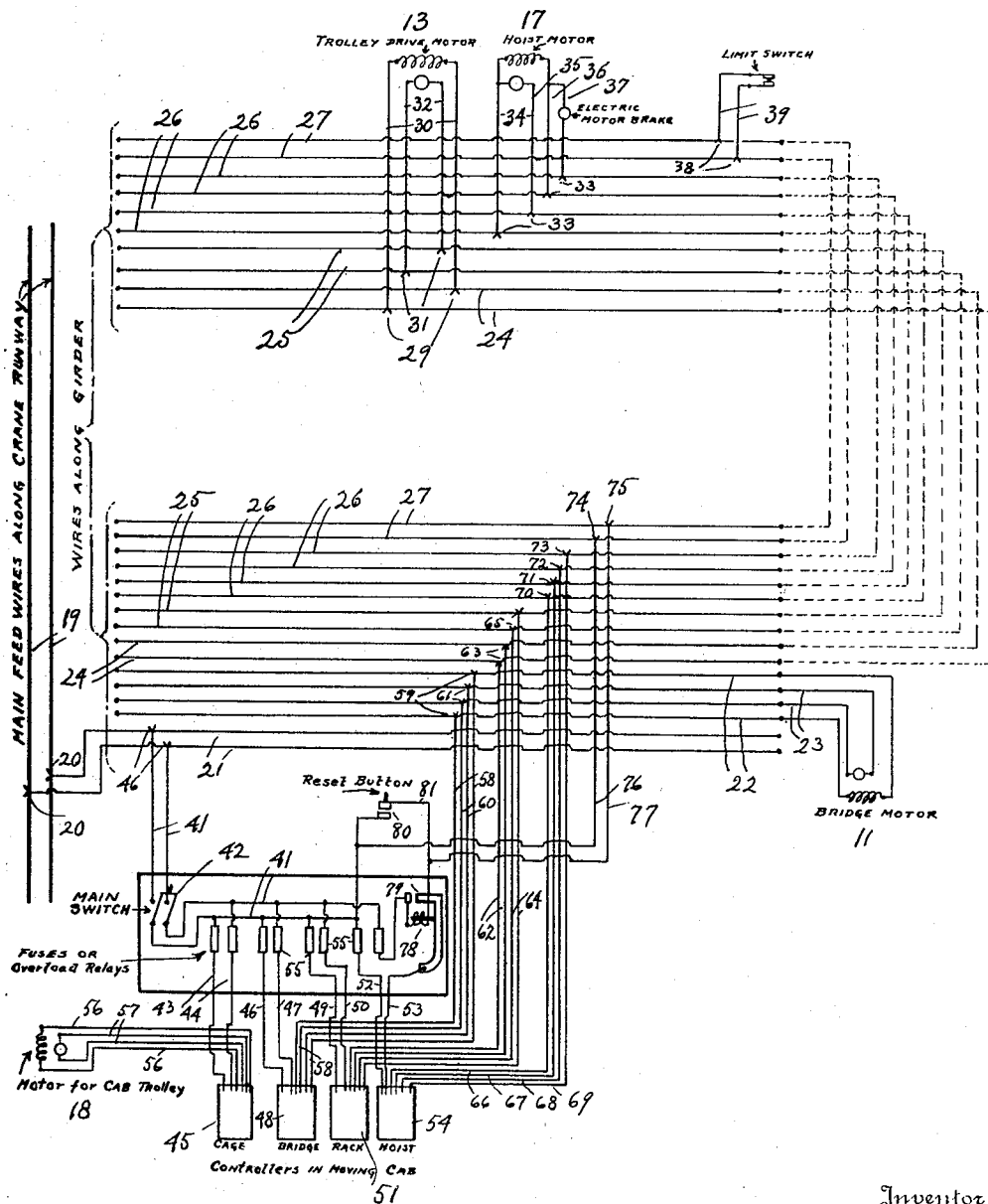
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FIG. 4.



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## UNITED STATES PATENT OFFICE

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## CRANE

Application filed June 2, 1927. Serial No. 196,127.

The present invention relates to cranes of the type in which a hoist trolley is propelled along an overhead support and in which the hoist propelling means and the hoisting means on the trolley are controlled from an operator's cab or cage, the invention being particularly applicable to traveling cranes of the bridge type.

The main object of the invention is to provide a crane having a hoist trolley and an operator's cage which are independently movable along an overhead support, such as a bridge, so that the movements of the trolley and the operation of the hoist may be controlled from the cage which may be in any desired position on the bridge.

In bridge cranes it is common practice to control the bridge and trolley propelling motors and the hoist motor from an operator's cage which usually is mounted on the bridge adjacent one end thereof or which in some cases has been mounted to travel with the hoist trolley. Where the operator's cage is fixed to the bridge the operator, when the trolley is at some distance from the cage, has difficulty in properly positioning the trolley with respect to a load to be lifted or with respect to the point to which the load is to be lowered. The operator also has difficulty in properly controlling the hoist and trolley to avoid obstacles in the path of the load and this difficulty is increased when intervening obstacles prevent him from accurately determining the position of the load with respect to such obstacles. Where the cage moves with the trolley the above mentioned difficulty is overcome but it is often impracticable to have the cage immediately adjacent the trolley, especially where the hoist is used over a furnace or a tank where the operator would be subjected to excessive heat or to disagreeable or dangerous fumes.

The present invention provides means whereby the operator in the cage may cause the cage to be shifted at any time to the position with respect to the trolley which is most convenient for the particular work being done.

A further object is to provide an overhead crane with a hoist trolley and an operator's

cage which travel independently, and which are so mounted on the overhead supporting member that one may move freely past the other.

With the above and other objects in view the invention may be said to comprise the device as illustrated in the accompanying drawings hereinafter described and particularly set forth in the appended claims together with such variations and modifications thereof as will be apparent to one skilled in the art to which the invention appertains.

Reference should be had to the accompanying drawings forming a part of this specification, in which:

Fig. 1 is a side elevation of a bridge crane embodying the invention;

Fig. 2 is a sectional view showing the hoist trolley and operator's cage in end elevation;

Fig. 3 is a fragmentary sectional view on an enlarged scale showing the current collectors on the cage and trolley in elevation;

Fig. 4 is a wiring diagram showing the motor controlling circuits.

The accompanying drawings show the invention applied to a bridge crane in which the bridge 1 is supported on end trucks 2 which have wheels 3 mounted to travel upon parallel tracks 4 suitably mounted upon a fixed supporting structure. The bridge 1 has a pair of parallel box girders 5 extending between the end trucks 2 and upon these box girders are mounted track rails 6 upon which a hoist trolley 7 travels. A pair of parallel girders 8 extend between the end trucks 2 at one side of the girders 5 and the girders 8 support track rails 9 upon which an operator's cage 10 is adapted to travel, the track for the operator's cage being spaced from the track for the trolley so that the operator's cage and trolley may be moved one past the other. The bridge 1 is propelled back and forth along the tracks 4 by means of a reversible electric motor 11 which drives a propelling shaft 12 which extends from one end of the bridge to the other and is connected by suitable gearing with a wheel of each of the two end trucks. The trolley 7 is provided with a propelling motor 13 which is connected by suitable gearing with one of the

wheel carrying axles of the trolley, and the trolley is also provided with a hoist drum 14 having a hoist cable 15 wound thereon upon which is suspended a load carrying member 16, the drum being operated by a  
5 suitable hoist motor 17. The cage 10 is propelled along the bridge by means of an electric motor 18 which has a driving connection with cage supporting wheels.

10 The four electric motors, above referred to, receive current from a common source and the current to each motor is controlled by a manually operable controller mounted upon the operator's cage 10 so that an opera-  
15 tor in the cage may cause the bridge to be propelled in either direction along its supporting tracks, the trolley or cage to be propelled to any desired position along the bridge and the hoisting drum to be operated to wind or  
20 unwind the hoist cable 15.

Referring particularly to Fig. 4 of the drawings, the electric current for operating the motors is supplied from two line wires 19 extending along one of the bridge sup-  
25 porting tracks which are engaged by two current collectors 20 carried by the bridge for supplying current to two line wires 21 which are attached to the collectors 20 and extend from one end of the bridge to the other.  
30 Alongside the current conducting wires 21 on the bridge there are four wires which also extend the full length of the bridge for supplying current to the bridge motor 11, two of these wires 22 being connected to the  
35 field and the other two 23 being connected to the armature of the motor. In addition to the conductors, above referred to, wires are provided along the length of the bridge for receiving current through the controllers on  
40 the cage and delivering the same to the motors on the trolley, and in order to permit the trolley and cage to move freely one past the other each of these last mentioned wires extend from one end of the bridge to the other  
45 and back, so that each wire has two portions, one adapted to be engaged by collectors on the cage and the other by collectors on the trolley, the portions engaged by the trolley collectors being in a group separate from  
50 the portions engaged by the cage collectors so that there is no interference between the current collectors on the trolley and the current collectors on the cage when one is moving past the other on the bridge. Two wires  
55 24 serve to supply current to the field of the trolley propelling motor 13, two wires 25 serve to supply current to the armature of the motor 13, four wires 26 serve to supply current to the hoist motor and two additional  
60 wires 27 are provided to permit the use of an automatic limit switch in connection with the hoist. The trolley 7 carries a pair of current collectors 29 which engage with the wires 24 and supply current through wires 30 to the  
65 field of the motor 13 and with a pair of col-

lectors 31 which engage the wires 25 supply current to the armature of the motor 13 through wires 32. Four collectors 33 on the hoist trolley engage with the four supply  
70 wires 26 and supply current to the field and armature of the motor 17 and to an electric motor brake through wires 34, 35, 36 and 37. The current supply wires 27 are engaged by current collectors 38 on the trolley which are  
75 in turn connected to the limit switch by wires 39.

The line wires 21 are engaged by collectors 40 on the cage which supply current to the controllers on the cage through line wires 41 which are provided with a main switch 42 by  
80 which the cage controllers may be disconnected from the current supply line. The line wires 41 are connected by leads 43 and 44 to a cage motor controller 45 on the cage, the leads 46 and 47 connect the wires 41 with a con-  
85 troller 48 for the bridge motor 11, leads 49 and 50 connect the wires 41 with a controller 51 for the trolley propelling motor and leads 52 and 53 connect the wires 41 with a controller 54 for the hoist motor, each of the  
90 leads between the wires 41 and the controllers being provided with fuses or overload relays 55.

Each of the motor controllers on the cage may be a controller of an old and well known  
95 type by which the current to the motor may be controlled to start, stop or reverse the same. The controller 45 for the cage propelling motor 18 is connected by leads 56 to the field of the motor 18 and by the leads 57  
100 to the armature thereof. The controller 48 for the bridge motor 11 is connected by leads 58 with current collectors 59 on the cage which engage with the wires 22 which are connected to the field of the motor 11 and  
105 leads 60 extend from the controller 48 to current collectors 61 on the cage which engage with the wires 23 which are connected to the armature of the motor 11. The controller 51 for the trolley propelling motor 13 is connected by leads 62 with current collectors 63  
110 which engage the wires 24 and by leads 64 with current collectors 65 which engage with the wires 25. The controller 54 for the hoist motor is connected by leads 66, 67, 68 and 69  
115 with current collectors 70, 71, 72 and 73 which engage with the wires 26 through which current is supplied to the hoist motor. The controllers are provided with suitable manually operable switches by means of which connection  
120 may be made between the desired leads to operate the various motors. The line wires 41 on the cage are connected through leads 76 and 77 with current collectors 74 and 75 on the cage which engage with the wires 27  
125 which are engaged by the current collectors 38 on the trolley which lead to the limit switch. The lead 77 is connected to one of the line wires 41 through a relay solenoid 78  
130 which actuates a switch member 79 in the lead

53 to the hoist motor controller. The limit switch as is common practice in electrically operated hoists is normally closed and positioned to be engaged and opened by a load carrying member to break the hoist motor circuit when the load has reached a predetermined height. In the present case the switch member 79 is normally held in closed position by the solenoid 78 since current will flow through the solenoid 78 lead 77 current collector 75 wire 27 to one of the collectors 38 and through the wires 39 and limit switch to the other collector 38 through the return wire 27 and lead 76 to a line wire 41. When the limit switch is opened the current through the solenoid 78 is interrupted, allowing the switch 79 to open, breaking the circuit through the controller 54 and hoist motor 17.

In order to reset the switch 79 to permit further operation of the hoist motor a reset button or switch 80 is provided in a shunt circuit 81 which includes the solenoid 78. By closing the push button switch 80 the current is caused to flow through the solenoid 78 to energize the same and close the switch 79 so that current can be supplied to the hoist motor 17 through the controller 54.

As shown in Fig. 1 of the drawings, the current collectors 20 are carried by a bracket 82 attached to one end of the bridge 1 and positioned to engage with the line wires 19, as shown in Figs. 2 and 3 of the drawings. The trolley current collectors are supported upon a suitable bracket 83 extending downwardly along the outer side of one of the girders 5 and the current collectors on the cage are all supported upon a suitable bracket 84, which is secured to the inner side of the cage and projects upwardly between the girders 5 and 8.

Having thus described my invention, what I claim is:

1. In a bridge crane, two tracks extending from one end of the bridge to the other, a current conductor arranged intermediate said tracks, a trolley on one of the tracks and having a current collector extending therefrom to a position intermediate the tracks and adapted to cooperate with said current conductor, and an operator's cage on the other of said tracks and likewise having a current collector extending therefrom to a position intermediate the tracks.

2. In a bridge crane, two tracks extending from one end of the bridge to the other, a plurality of current conductors arranged intermediate said tracks, a trolley on one of the tracks and having a current collector extending therefrom to a position intermediate the tracks and engaging certain of said conductors, and an operator's cage on the other of said tracks and having a current collector extending therefrom to a position intermediate the tracks and engaging other of said conductors.

3. In a bridge crane, two tracks extending from one end of the bridge to the other, a current conductor arranged intermediate said tracks, a trolley on one of the tracks and having a current collector extending therefrom to a position intermediate the tracks and adapted to cooperate with said current conductor, and an operator's cage on the other of said tracks and having a current collector extending therefrom to a position intermediate the tracks, said current collectors each comprising a bracket secured to their respective member.

4. In a bridge crane, two tracks extending from one end of the bridge to the other, a current conductor arranged intermediate said tracks, a trolley on one of the tracks and having a current collector extending therefrom to a position intermediate the tracks and adapted to cooperate with said current conductor, and an operator's cage on the other of said tracks and likewise having a current collector extending therefrom to a position intermediate the tracks, said current collectors each comprising a bracket secured to their respective members and having the portions thereof which are intermediate the tracks in alignment.

5. In a bridge crane, a pair of parallel girders extending from one end of the bridge to the other and each supporting a rail, said rails forming a track, a trolley arranged on said track, a second pair of parallel girders extending from one end of the bridge to the other and arranged at one side of the first named pair of girders, rails supported by said last named pair of girders and forming a track, an operator's cage arranged on said last named track, current conductors extending from one end of the bridge to the other and arranged intermediate said pairs of girders, current collectors carried by the trolley and the cage and engaging said conductors, said current collectors comprising a bracket secured to their respective members and having an arm thereof extending intermediate the pairs of girders.

In testimony whereof, I hereunto affix my signature.

WALTER C. HEINLE.

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