June 16, 1953 R. P. FOX 2,642,007

CRANE PROPELLED DRIVE

Filed Aug. 21, 1950 3 Sheets-Sheet 1

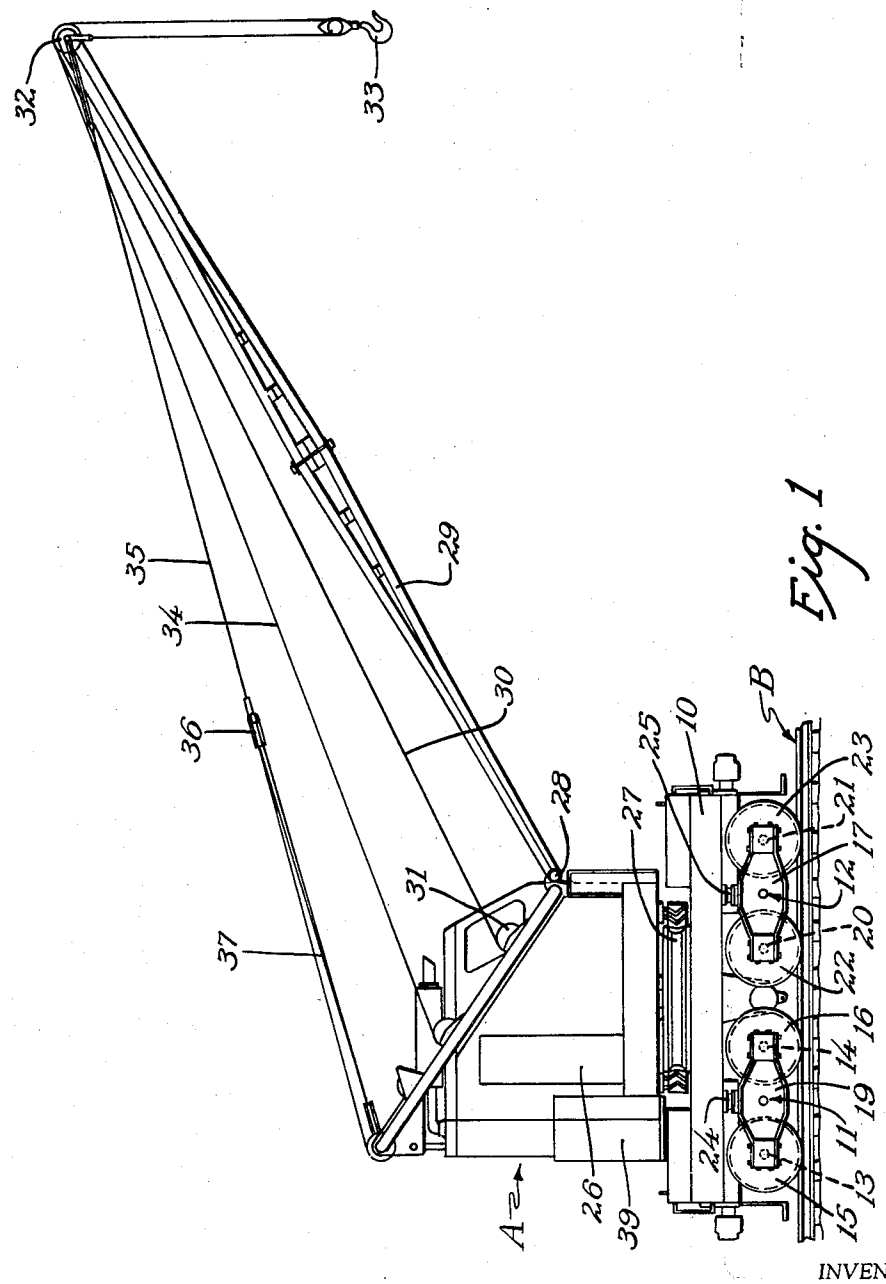

Fig. 1

INVENTOR

Robert P. Fox

BY Robert M. Dunning

ATTORNEY

June 16, 1953 R. P. FOX 2,642,007

CRANE PROPELLED DRIVE

Filed Aug. 21, 1950 3 Sheets-Sheet 2

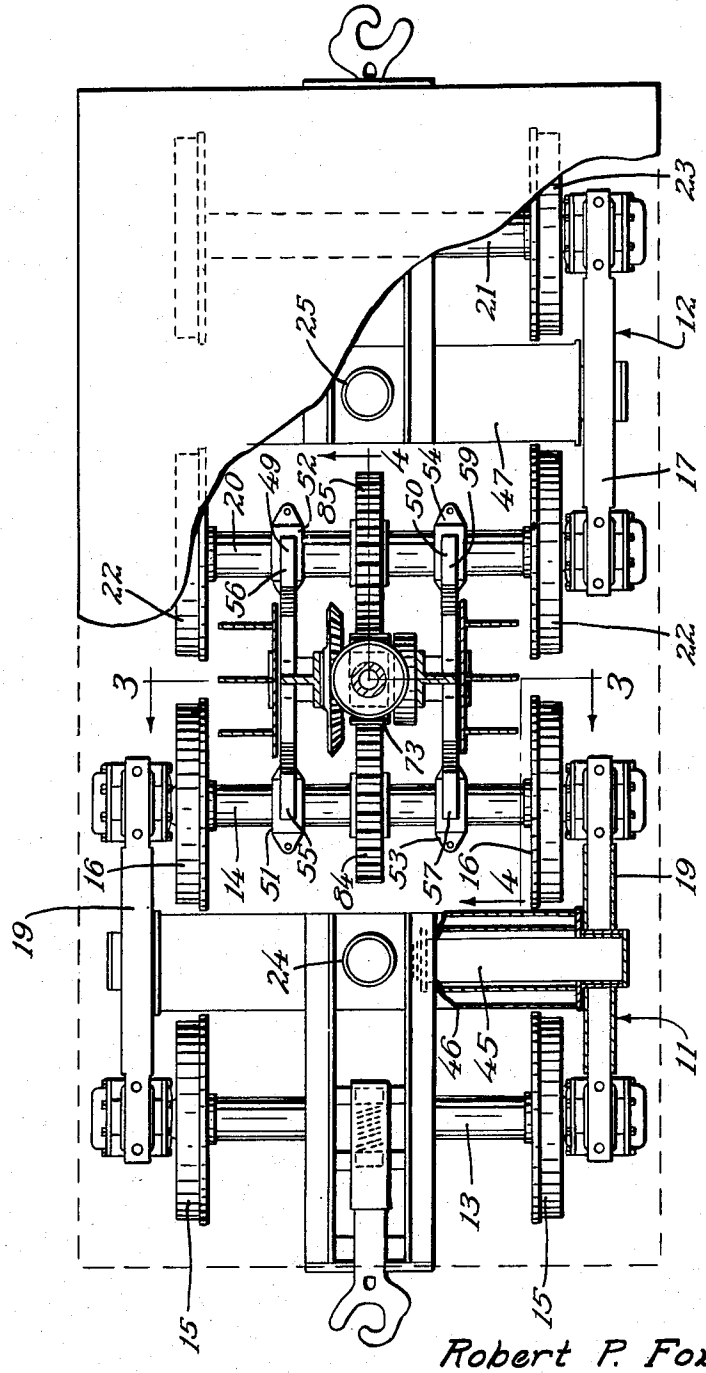

Fig. 2

INVENTOR

Robert P. Fox

BY Robert M. Dunning

ATTORNEY

June 16, 1953 R. P. FOX 2,642,007

CRANE PROPELLED DRIVE

Filed Aug. 21, 1950 3 Sheets-Sheet 3

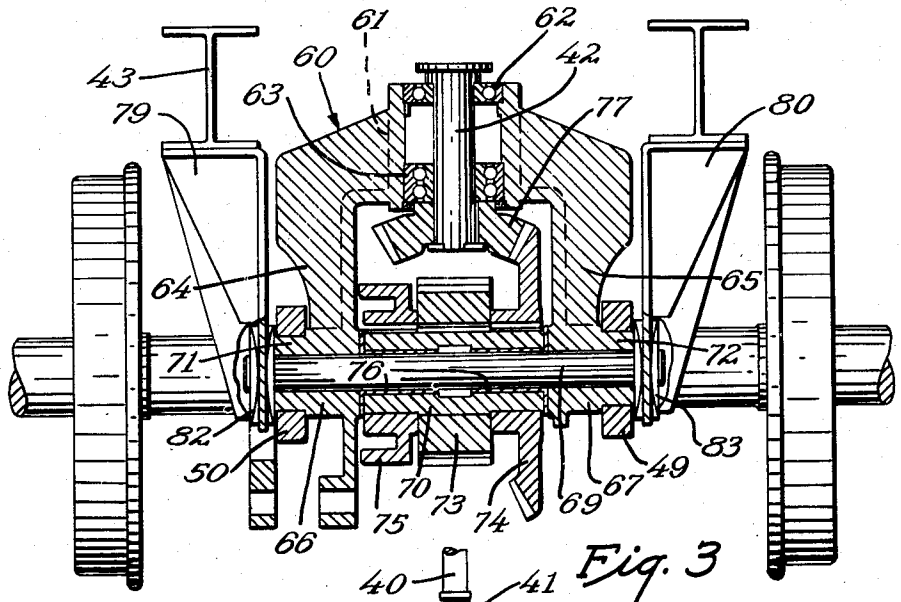

Fig. 3

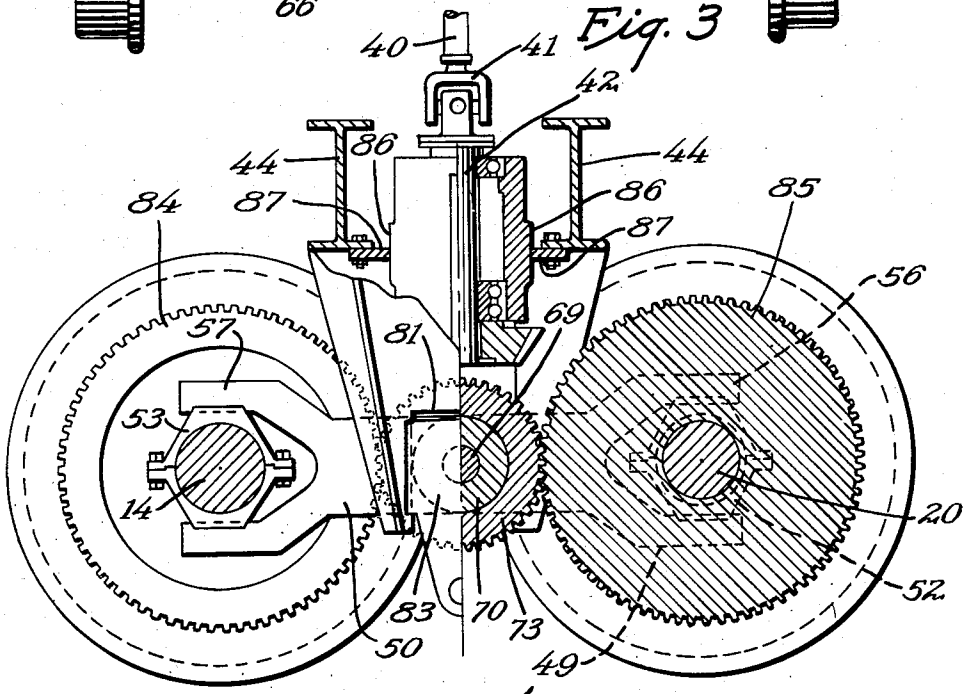

Fig. 4

INVENTOR.
Robert P. Fox
BY Robert M. Dunning
ATTORNEY

Patented June 16, 1953 2,642,007

UNITED STATES PATENT OFFICE

2,642,007

CRANE PROPELLED DRIVE

Robert P. Fox, Duluth, Minn., assignor to Clyde Iron Works, Inc., Duluth, Minn., a corporation of Minnesota

Application August 21, 1950, Serial No. 180,573

15 Claims. (Cl. 105—108)

1

This invention relates to an improvement in crane propelled drive wherein it is desired to provide an effective method of driving the trucks of a railway crane or the like.

Cranes which are supported for movement along railway tracks are often provided with a machinery platform which is supported by a pair of separably pivotal trucks. Each of the trucks usually includes two spaced axles having railway wheels at each end thereof. Each truck is supported upon a vertical pivot which is located midway between the axles. In view of the fact that the supporting tracks have high spots and low spots, and in view of the further fact that the two trucks pivot relative to one another, as well as relative to the crane itself, some difficulty is found in providing a drive connection between the truck axles and the motive power for the crane.

Cranes of the type in question are usually rotatably supported on a vertical axis and the axis of rotation of the crane is located somewhere near the center of the machinery platform. The power unit of the crane is mounted on the rotatable crane body. As a result the connection between the crane power unit and the drive wheels of the crane must extend through the axis of rotation of the crane body. This arrangement locates the drive shaft between the two trucks. Some difficulty is experienced transmitting motion from this vertical drive shaft to the drive axles of the two trucks in view of the fact that either truck may be angularly related to the other, or may be higher or lower than the other truck because of the variations in the track.

This difficulty is emphasized when the drive wheels of both trucks pass over high or low spots in the track at the same time, raising or lowering both drive gears on the drive wheel axles simultaneously. In such an instance, the gears change their angular relation with the drive pinion in opposite directions, one gear tending to advance the speed of the pinion and the other gear tending to retard the speed thereof. This places a tremendous stress upon the meshing teeth.

It is an object of the present invention to provide a crane propel drive for a railroad type crane in which the drive transmission is supported by the driving axles of the trucks. As a result the vertical position of the drive pinion is regulated by the relative position of the two axles. The drive transmission is thus floatingly supported by the drive axles and may raise or

2

lower in accordance with variations in these track levels.

A feature of the present invention resides in the provision of a drive transmission including a pinion shaft supporting yoke mounted near the lower end of a vertical drive shaft extending through the axis of rotation of the crane body. This yoke is mounted in such a manner that it is held from rotation or from lateral and longitudinal movement, but may move vertically without restraint. Centering bars are pivotally connected to the yoke, these centering bars being supported at opposite ends by the axles of the drive wheels. As a result the vertical movement of either axle or of either end of either axle acts to change the vertical position of the yoke and to help maintain the drive pinion in proper relative position to the driven gears.

A further feature of the present invention lies in the provision of a crane propelled drive including a central drive pinion which is engageable with driven gears on the driving axle of each of the trucks. The drive pinion is supported by a pair of generally parallel centering bars which are supported by the axles of the drive wheels of the two trucks. As any wheel on either of the drive axles moves upwardly or downwardly, a corresponding motion is transmitted through the centering bars and the drive pinion is raised and lowered accordingly. Thus as a result the drive pinion is maintained in a position where it may engage the driven gears with the least amount of stress thereupon.

These and other objects and novel features of my invention will be more clearly and fully set forth in the following specification and claims.

In the drawings forming a part of my specification:

Figure 1 is a side elevational view of a crane showing the general arrangement of parts therein.

Figure 2 is a top plan view of the crane illustrated in Figure 1.

Figure 3 is a sectional view centrally through the drive shaft and drive pinion, the position of the section being indicated by the line 3—3 of Figure 2.

Figure 4 is a sectional view through a portion of the mechanism, the position of the section being indicated by the line 4—4 of Figure 2.

The crane is illustrated in general by the letter A and is designed to travel on a railway track illustrated in general by the letter B. The crane A includes a machinery platform 10 which is supported by a pair of railway trucks 11 and

12. The truck 11 includes spaced axles 13 and 14 upon which are mounted pairs of flanged wheels 15 and 16 respectively. The truck 12 includes spaced truck frames, such as 17, similar to the truck frames 19 of the truck 11. The truck frames 17 support axles 20 and 21 to which are secured wheels 22 and 23 respectively.

The truck 11 includes a central vertical pivot 24 by means of which the truck 11 is secured to the machinery platform 10. The truck 12 is also provided with a center pivot 25 which connects the truck 12 to the machinery platform 10. Thus both of the trucks 11 and 12 may pivot relative to each other and relative to the machinery platform so that the crane may travel around a curve in the track.

The crane cab or body 26 is supported upon a circular supporting unit 27 about the axis of which it may pivot. The cab 26 supports the power unit of the crane which may serve to raise or lower the boom, may raise or lower the load, may pivot the cab, or may drive the entire crane along the tracks B. In the particular crane illustrated a boom 29 is pivotally supported at 28 to the cab. A load line 30 extends over suitable sheaves such as 31 and 32 to support a hook such as 33 on a crane shell bucket or the like. In the event a bucket is supported a holding line 34 is provided from the cab. A boom hanger cable 35 is pivotally connected to the free end of the boom and is connected by suitable sheaves 36 to the boom peaking line 37. The various lines are separated by the necessary arrangement of cable drums within the cab 26.

An engine or other power supply is connected to the cab and is indicated in general at 39. This engine is connected by suitable drive mechanism, not illustrated in the drawings, to a vertical drive shaft 40. This drive shaft 40 is connected by a suitable universal joint structure 41 to the drive shaft 42 forming a part of the crane propel drive illustrated in Figures 2 through 4 of the drawings.

It will be noted that the cab 26 is mounted with its pivotal axis near the center of the machinery platform so that the cab may rotate freely about its circular track support 27. The universal joint structure extends between a pair of longitudinally extending spaced I-beams 43 best illustrated in Figure 3 of the drawings and secured to the machinery platform 10. The universal joint structure ends between a pair of transversely extending eye beams 44 which are between the I-beams 43. The I-beams 44 are also connected in any suitable way to the machinery platform 10. The drive shaft 40 may if desired contain a universal joint near its upper extremity so as to permit a certain amount of angularity between the drive shaft 40 and the drive shaft 42.

As illustrated in Figure 2 of the drawings, the truck frames 19 of the truck 11 are supported by a transversely extending pair of aligned shafts 45 which are pivotally supported by the transversely extending bolster 46. Thus the truck frames 19 may pivot independently about a transverse axis. The truck frames 17 are similarly pivotally connected to a bolster 47 which in turn is pivotally connected along a vertical pivot to the machinery platform. Thus the individual axles may tilt to some extent as the wheels pass over high and low portions of the track B.

A pair of longitudinally extending centering bars 49 and 50 extend between the drive axles 14 and 20 of the trucks 11 and 12. The centering bar 49 is supported by bearings 51 and 52 on the axles 14 and 20 respectively. The centering bar 50 is similarly supported by bearings 53 and 54. The manner in which the ends of the centering bars are supported by their bearings is best indicated in Figure 4 of the drawings. The centering bar 49 is provided with bifurcated ends 55 and 56 which straddle the bearings 53 and are longitudinally slidable in grooves therein. The centering bar 50 is provided with similar bifurcated ends 57 and 59 which straddle the bearings 53 and 54 and extend in grooves therein. The engagement between the centering bars and their respective bearings is loose enough to permit angularity between the trucks.

With reference to Figure 3 of the drawings, it will be noted that a yoke 60 is supported by the centering bars 49 and 50 intermediate the driving axles 14 and 20. The yoke 60 includes a substantially vertical sleeve 61 which supports spaced bearings 62 and 63 for rotatably supporting the drive shaft 42. The lower end of the yoke 60 is divided into spaced sides 64 and 65 which are provided with axially aligned hubs 66 and 67. The hubs 66 and 67 support a pivot shaft or pin 69 for supporting a hub 70. The ends of the hubs 66 and 67 form journals 71 and 72 which extend through the centering bars 50 and 49 respectively to pivotally support the yoke 60 between the arms 49 and 50.

The hub 70 supports the drive pinion 73, a bevel gear 74, and a brake wheel 75. All of these elements are keyed to the hub to rotate in unison therewith. Bushings 76 extend between the pin 69 and the hub 70 to permit free rotation of the hub about the pin.

A bevel gear 77 is supported upon the lower end of the drive shaft 42 between the sides 64 and 65 of the yoke 60. The bevel gear 77 meshes with the gear 74 to rotate the same. Rotation of the gear 74 acts through the hub 70 to rotate the drive pinion 73 and the brake wheel 75.

A pair of brackets 79 and 80 are secured to the I-beams 43 to extend downwardly therefrom on opposite sides of the yoke 60. These brackets 79 and 80 are vertically slotted as indicated at 81 in Figure 4 of the drawings to accommodate vertically slidable guide blocks 82 and 83. The pin 69 extends through the guide blocks 82 and 83 and is thus held in place thereby. It will therefore be obvious that the guide blocks 82 and 83 hold the pin 69 from rotation about a vertical axis and prevent the pin 69 from moving longitudinally or laterally.

The guide blocks are so shaped that the pin 69 may tilt within predetermined limits out of normal horizontal position as one end of the pin is lower than the other. As a result the yoke 60 is held in such a way that it may move vertically between the brackets 79 and 80 and may tilt somewhat when the track over which the drive wheels pass is uneven. Provision is made in the drive shaft arrangement for limited axial movement of the drive shaft 42 upon vertical movement of the yoke 60.

The operation of my propel drive mechanism is as follows:

When it is desired to drive the drive wheels 16 and 22 on the drive axles 14 and 20 respectively, the power unit is connected to the drive shaft 40 to rotate the same. This drive shaft 40 acts through the universal joint 41 to drive the drive shaft 42. Rotation of the shaft 42 acts through the bevel gears 77 and 74 to rotate the drive pinion 73 and the brake wheel 75. Rotation of the drive pinion 73 acts through the gears

84 and 85 to rotate the drive axles 14 and 20 to which they are secured.

The drive pinion 73 is provided with a wide face relative to the gears 84 and 85 so that the pinion will stay in continuous contact with the wheel gears when the trucks swivel on a curved track. The gear mesh is only slightly affected by the swivel action of the trucks because it is perpendicular to a radial line through the axis of swivel.

As any wheel raises or lowers in its travel over an uneven track, the centering bars 49 and 50 will raise and lower correspondingly so as to maintain the axis of the drive pinion on a line between the centers of the drive axles. By supporting the drive pinion to float between the axles in the manner specified, excessive stress between the drive pinion and the wheel gears is avoided and wear of the parts is correspondingly reduced.

The axes of the pivot pin 69 and of the drive shaft 42 remain in a common vertical plane extending transversely of the machinery platform. The pin 69 is held in this plane by the vertical slots 81 in the brackets 79 and 80, and by the guide blocks 82 and 83 slidable therein. The yoke 60 is provided with opposed flat bosses, 86, which bear against rub plates 87 on the I-beams 44. These rub plates do not restrict vertical movement of the yoke 60, but prevent the yoke from tilting about the axis of the pin 69.

In accordance with the patent statutes, I have described the principles of construction and operation of my crane propelled drive, and while I have endeavored to set forth the best embodiments thereof, I desire to have it understood that obvious changes may be made within the scope of the following claims without departing from the spirit of my invention.

I claim:

1. A crane propelling drive for use in conjunction with cranes mounted upon a platform supported by a pair of railway trucks each having a drive axle, the drive including a drive shaft extending substantially vertically between the trucks, a drive pinion mounted on a generally horizontal axis between the trucks, means connecting the drive shaft to the drive pinion to rotate said drive shaft and drive pinion in unison, means supporting the drive pinion upon the drive axles of the trucks, and gear means on the drive axles in mesh with said drive pinion.

2. The structure described in claim 1 and in which the means supporting the drive pinion includes longitudinally extending spaced centering bars supported at each end by the drive axles and connected intermediate their ends to the drive pinion support.

3. A crane propel drive for cranes mounted upon a platform supported by a pair of railway trucks each having a drive axle, the drive including a drive pinion between the trucks, gears on the drive axles in mesh with said drive pinion, a drive pinion support including members extending longitudinally between the trucks and supported only by said drive axles which are in mesh with said pinion.

4. A crane propel drive for driving a crane mounted upon a platform supported by a pair of railway trucks each having a drive axle, the drive including a pinion between the trucks, wheel gears on the drive axles in mesh with said pinion, and a pinion support including a shaft within said pinion, and a pair of longitudinally extending centering bars supported by said drive axles on opposite sides of the wheel gears and individually pivotally connected to said shaft.

5. The structure described in claim 4 and including a body bridging said pinion pivotally supported between said centering bars for supporting opposite ends of said shaft.

6. A crane propel drive for use in conjunction with cranes mounted upon the platform supported by a pair of railway trucks each having a drive axle, the drive including a pair of centering bars extending longitudinally between the trucks and being supported in spaced relation by said drive axles, a member pivotally supported by said centering bars between the ends thereof, a drive pinion pivotally supported by said member between said centering bars, wheel gears on said drive axles in mesh with said drive pinion, and drive means connected to said member for driving said pinion.

7. A crane propel drive for propelling a crane mounted upon a pair of spaced railway trucks each having a drive axle, the drive including a pair of centering bars extending longitudinally between the trucks and individually supported thereby, a drive pinion between said centering bars and midway between said drive axles, wheel gears on said drive axles in mesh with said drive pinion, and a drive pinion support including a body bridging said pinion and extending transversely between said centering bars, said body being pivotally supported by said centering bars, and drive means connected to said pinion for actuating the same.

8. The structure described in claim 7 in which the drive means includes a pair of bevel gears and a vertically extending drive shaft connected to one of the bevel gears and means connecting the other bevel gear to said pinion to rotate therewith.

9. The structure described in claim 7 and including means for holding the axis of the drive pinion on a single vertical plane transversely between said trucks.

10. A crane propel drive for driving a crane mounted upon a platform supported by a pair of rail truck connected to the platform along substantially parallel vertical pivots, the trucks each having a drive axle, the drive including a pair of centering bars extending longitudinally between the drive axles and individually supported thereby, a body pivotally supported by said centering bars between the ends thereof on a transverse pivot, a shaft supported by said body, a drive pinion encircling said shaft, wheel gears on said drive axles in mesh with said drive pinion, brackets secured to said platform on either side of said body, means cooperable between said brackets and said body for holding said shaft in a vertical plane transversely of the platform and between the vertical pivots connecting the trucks to the platform, and drive means connected to said pinion for actuating the same.

11. The structure described in claim 10 and in which the drive means includes a pair of bevel gears, one of which is connected to the drive pinion for movement therewith and the other of which is on said shaft to rotate therewith.

12. The structure described in claim 10 and in which the drive mechanism includes a pair of meshed bevel gears, one of which is connected to the pinion for movement in unison therewith, and a vertical drive shaft upon which the other bevel gear is supported.

13. A crane propel drive for use in connection with cranes mounted upon a pair of rail-

way trucks each having a drive axle, the drive including a pair of longitudinally extending centering bars extending between said trucks and supported by said drive axles, a yoke pivotally connected to said centering bars between said trucks, a pivot transversely of said yoke and coaxial with the pivotal connection between the yoke and the centering bars, a pinion rotatable about said pivot, wheel gears on said drive axles in mesh with said pinion, and drive means connected to said pinion to operate the same.

14. The structure described in claim 13 and including means for holding said pivot on a vertical plane transversely between said trucks.

15. The structure described in claim 13 and including brackets secured to said platform on opposite sides of said yoke, and cooperable means between said brackets and said yoke for holding said pivot on a vertical plane transversely of the platform and intermediate between said trucks.

ROBERT P. FOX.

References Cited in the file of this patent

UNITED STATES PATENTS

Number	Name	Date
50,282	Shaw	Oct. 3, 1865
158,031	Chamberlain	Dec. 22, 1874
1,222,610	Dunkley	Apr. 17, 1917
2,272,679	Ostermann	Feb. 10, 1942
2,296,465	Charbonneau	Sept. 22, 1942

FOREIGN PATENTS

Number	Country	Date
369,061	France	Dec. 28, 1906
405,124	Germany	Oct. 28, 1924