Dec. 18, 1951 G. E. DATH 2,578,784

WORM GEARING

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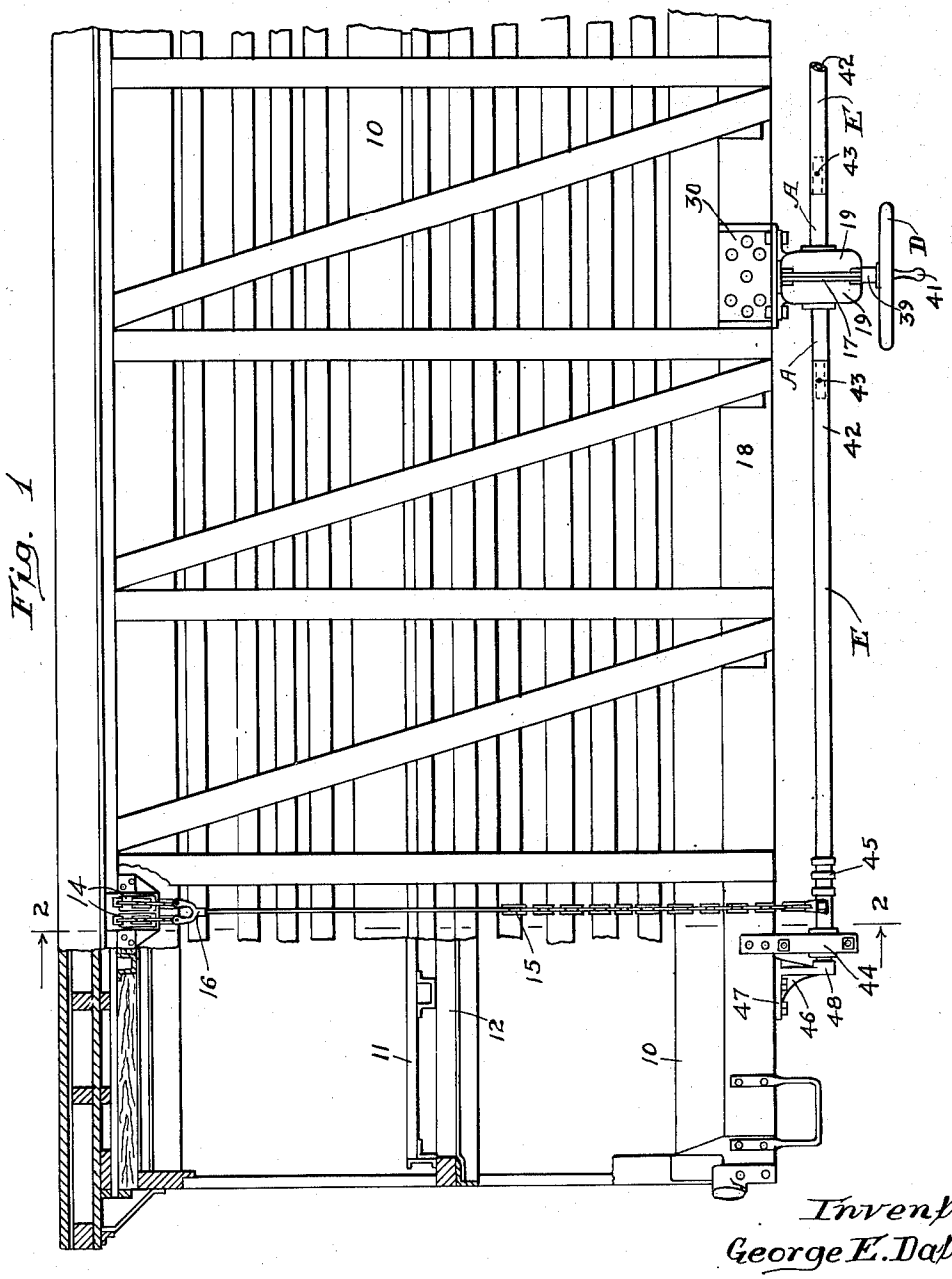


Fig. 1

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Fig. 2

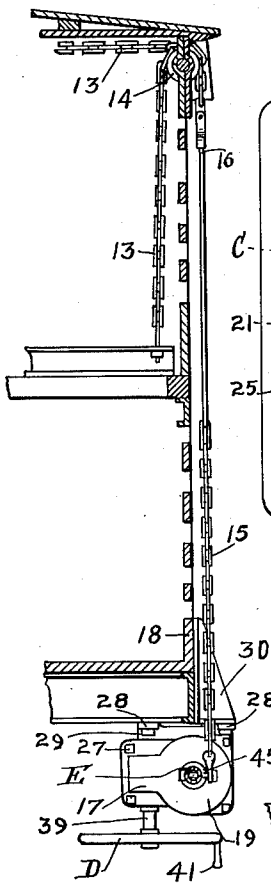


Fig. 3

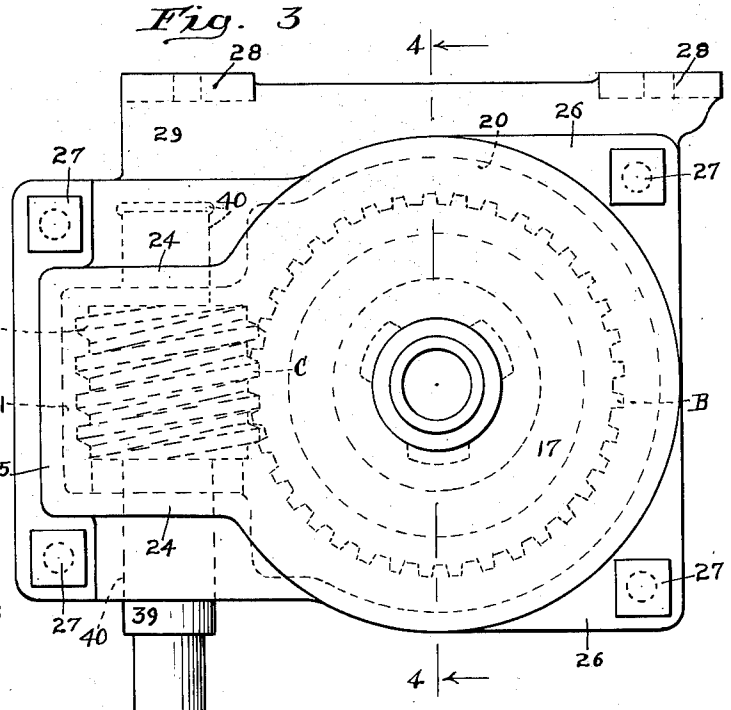
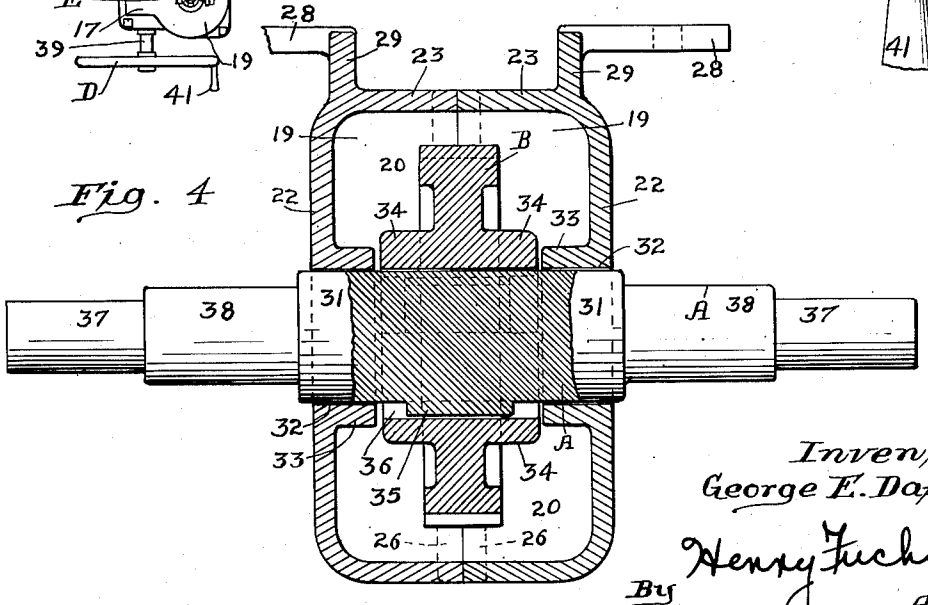


Fig. 4



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Fig. 5

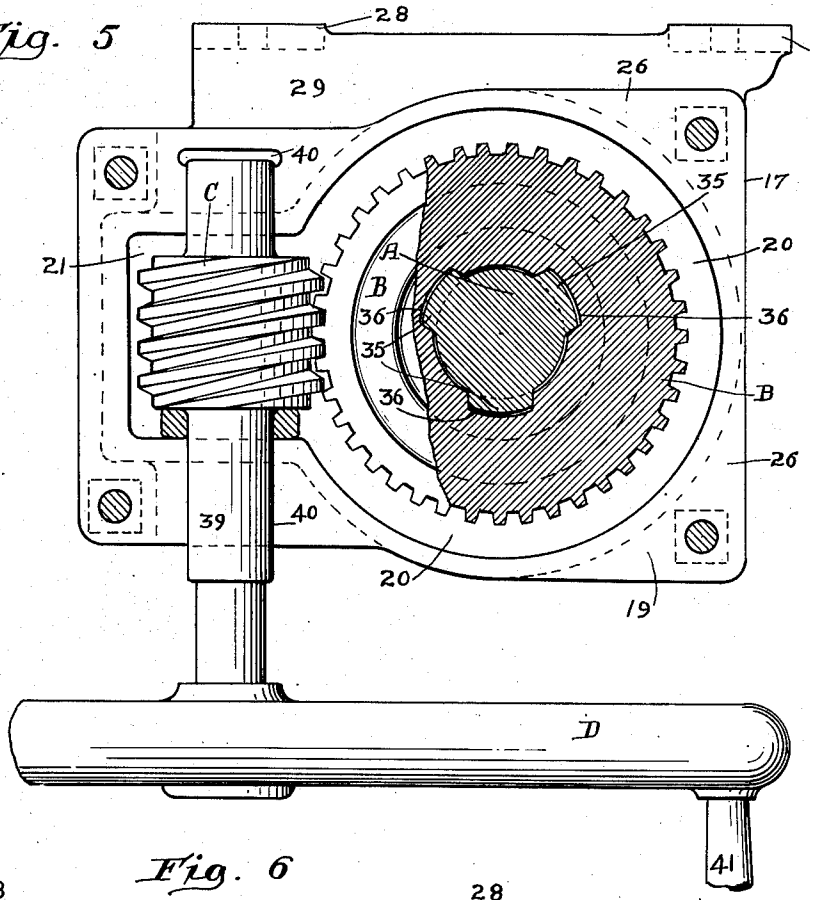
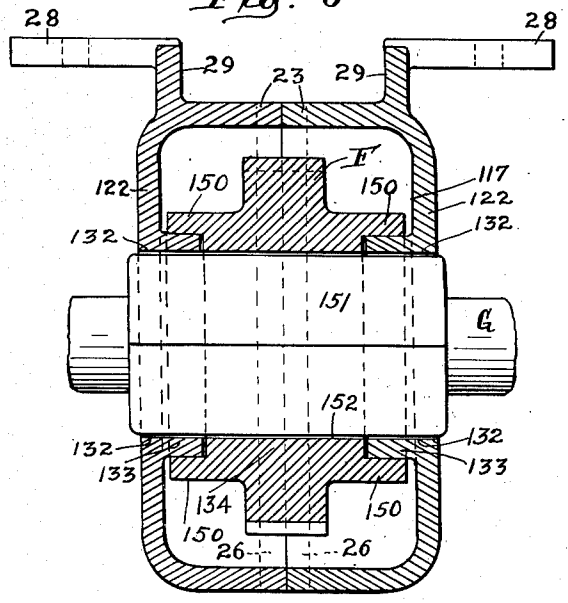


Fig. 6



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UNITED STATES PATENT OFFICE

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WORM GEARING

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Application March 3, 1947, Serial No. 731,904

1 Claim. (Cl. 74—425)

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This invention relates to improvements in deck hoists for railway cars.

One object of the invention is to provide simple and efficient, manually operated mechanism for raising and lowering the upper deck or floor of a railway car.

A more specific object of the invention is to provide a manually actuated hoisting mechanism for raising and lowering the upper deck of a railway car, comprising worm gear actuated chain winding means of simple and compact design, including a winding shaft, driven by the worm gearing which is enclosed within a protective housing mounted on the car, wherein the winding shaft is slidably connected to the driving gearing, thereby protecting the bearings and other parts of the mechanism against end thrust.

Other objects of the invention will more clearly appear from the description and claim hereinafter following.

In the accompanying drawings forming a part of this specification, Figure 1 is a side elevational view of one end of a railway stock car, said view being partly broken away and partly in section, and illustrating my improvements in connection therewith. Figure 2 is a transverse, vertical sectional view, corresponding substantially to the line 2—2 of Figure 1. Figure 3 is a side elevational view, on an enlarged scale, of the chain winding mechanism shown at the bottom of the car in Figure 2. Figure 4 is a vertical sectional view, corresponding substantially to the line 4—4 of Figure 3. Figure 5 is a view similar to Figure 3, with the front section of the housing removed, and showing the driving worm wheel of the worm gear mechanism partly in section. Figure 6 is a view similar to Figure 4, illustrating another embodiment of the invention.

In said drawings, 10 indicates the body of a railway stock car provided with an upper deck or floor 11, resting on supporting rails 12 secured to the inner sides of the side and end walls of the car. The deck or floor 11 is arranged to be hoisted or raised, out of the way, positioned immediately below the roof the car, thereby making the car convertible to the single deck type. Raising and lowering of the deck 11 is accomplished by means of a plurality of lifting chains 13—13 at intervals along the length of the car, the chains 13 being arranged in sets, each set being anchored to opposite sides of the deck 11 and trained over suitable sheaves 14—14 at the top of the car at opposite sides thereof, the sheaves 14 at one side of the car only being shown in the drawings. Each set of chains 13—13 is operatively connected

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to a vertically extending transmission chain 15 by a yoke rod 16.

In carrying out my invention, referring first to the embodiment shown in Figures 1 to 5 inclusive, I provide broadly a rotary shaft A, a worm wheel B for rotating the shaft A, a worm element C meshing with the worm wheel, a hand wheel D for actuating the worm element, and a chain winding shaft E coupled to the rotary shaft A.

The operating parts of the worm gear means, comprising the worm wheel B and the worm element C, are contained in a vertically split two-part housing 17 suspended from the side sill of the car, which side sill is indicated by 18 in the drawings.

The two parts or sections of the housing, which are indicated by 19—19, are of similar design, the same being right and left, as seen in Figures 1 and 4. The housing 17 comprises a hollow, drum-like portion 20 provided with a radially disposed, laterally extending chamber portion 21 of smaller size, communicating with the interior of said drum portion. Each section 19 of the housing has a vertical wall 22, which forms one of the opposite side walls of the housing, a cylindrical wall portion 23 extending laterally inwardly from the side wall and which forms part of the cylindrical outer wall of the drum portion 20 of the housing, horizontally disposed, short, top and bottom walls 24—24, and a vertical end wall 25, which form, respectively, portions of the top and bottom and end walls of the chamber portion 21. Each part or section 19 of the housing is provided with a vertically disposed, securing flange 26 on its inner side extending from the wall 23 of the drum portion and the top, bottom, and side walls of the chamber portion 21 thereof. The two sections 19—19 of the housing 17 are secured together by means of bolts 27—27, extending through the flanges 26—26. At the top thereof, the housing 17 is provided with two pairs of horizontally extending securing ears 28—28 and 28—28 at opposite sides thereof, formed, respectively, on the two sections of the housing and connected thereto by upstanding webs 29—29, the ears of each pair being located at opposite ends of the corresponding web 29. The housing 17 is suspended from the side sill 18 by angle brackets 30—30 riveted to the sill. The ears 28—28 and 28—28 of the housing are bolted to the horizontal bottom flanges of the angle brackets.

The worm wheel B is rotatably supported within the drum portion 20 of the housing, being supported on the shaft A, which extends there-

through, and has a cylindrical bearing portion 31 between its ends, which projects from opposite sides of the worm wheel and is journaled in aligned bearing openings 32—32 formed in the opposite side walls 22—22 of the housing. The bearing openings 32—32 are reenforced by cylindrical flanges or sleeves 33—33, which project from the inner sides of the walls 22—22 and embrace the hub portion 34 of the worm wheel B at opposite sides to hold the latter against lateral displacement within the housing.

The shaft A is endwise slidable or shiftable with respect to the worm wheel B, but rotatable in unison therewith, being provided with lengthwise extending, radially projecting key portions 35—35—35 engaged in key slots 36—36—36 formed in the hub portion of the worm wheel B. As will be seen upon reference to Figure 4, the key portions 35 are shorter than the slots 36 in which they engage, thus providing clearance between the ends of the key portions and the inner ends of the bearing sleeves 33—33 to permit endwise displacement or shifting of the shaft A to a limited extent with respect to the worm wheel B and the housing 17. Exteriorly of the housing 17, the shaft A is of reduced diameter at each end thereof, each of said ends being provided with a portion 37 of considerably smaller diameter than the portion 31 and a section 38 between the portions 37 and 31 of a diameter slightly larger than the portion 37, but smaller than that of the portion 31.

The worm element C is arranged within the chamber portion 21 of the housing and meshes with the worm wheel B, being supported by the hand wheel shaft 39, which is formed integral therewith. The hand wheel shaft 39 extends vertically and is journaled in bearing members 40—40 at the top and bottom of the chamber 21, formed partly on each section 19 of the housing, each housing section carrying one-half of each bearing member 40. The lower end of the hand wheel shaft 39 is of reduced diameter, as shown, and carries the hand wheel D, which preferably has a depending hand grip member 41 on the rim thereof.

The split housing arrangement provides for assembling of the parts in the following manner: A worm wheel B is first placed in position on the shaft A. The worm element C and the shaft A, with the worm wheel B thereon, are then assembled with one of the sections 19 of the housing by engaging one end of the shaft through the bearing opening 32 of said housing section and placing the worm in position by seating the bearing portions of the hand wheel shaft 39 in the half sections of the bearings 40—40. The other part or section 19 of the housing is then placed over the assembled parts and the two parts or sections 19—19 are secured together by the bolts 27—27.

The winding shaft E is in the form of a plurality of cylindrical tubular members 42—42, coupled to opposite ends of the rotary shaft A of the worm gear mechanism, being telescoped over the reduced end portions 37—37 of said shaft and secured thereto by pins 43—43. Suitable bearing brackets, which depend from the side sill 18 of the car, are provided at intervals along the shaft E for rotatably supporting the same, only one of these brackets, which is indicated by 44, being shown in the drawings. The bracket 44, shown in the drawings, is at one end of the car and supports the corresponding end of the shaft E. Inwardly of this bracket 44, the shaft E is

provided with a winding section 45 to which the lower end of the transmission chain 15 at this end of the car is anchored. As will be understood, the shaft E is provided with similar winding sections at intervals throughout its length to take care of the several transmission chains of the different sets of lifting chains provided throughout the length of the car.

To brace the shaft E against endwise movement, abutment brackets are provided at opposite ends of the car, which engage the ends of the shaft. The abutment bracket at one end of the car only is shown in the drawings, the same being indicated by 46. This bracket is in the form of an angle member having the horizontal flange 47 thereof secured to the underneath side of the sill 18, and the depending vertical flange 48 thereof bearing on the corresponding end of the shaft E. As will be evident, the shaft E, which extends from one end of the car to the other, has considerable weight, and being subject to longitudinally acting jolts or jars in the stopping and starting of the car, as well as in switching operations, has a tendency to be displaced lengthwise in opposite directions. The abutment brackets 46 serve to brace the shaft E against longitudinal shifting to a considerable extent. However, any jolts or jars to which the shaft E may be subjected, which are not taken care of by the brackets 46, are also transmitted to the rotary shaft A of the worm gear driving operating mechanism, but in my improved construction the bearings and other parts of the mechanism are relieved of such jolts and jars by the sliding arrangement of the shaft A in the worm wheel B and bearings of the housing 17, thus protecting the parts against damage, which might otherwise occur. This improved arrangement also relieves the worm gear mechanism and housing of end thrust imparted to the winding shaft due to winding of the chain thereon.

Referring next to the embodiment of the invention illustrated in Figure 6, the mechanism is the same as that illustrated in Figures 1 to 5 inclusive, with the exception that a somewhat different connection is employed between the rotary shaft of the worm gear operated means and that the worm wheel, which is indicated by F, and is carried by the rotary shaft, which is indicated by G, is journaled on the bearing means on the housing, which is indicated by 117. The housing 117 is of the same design as the housing 17 hereinbefore described, having transversely aligned openings 132—132 in the side walls 122—122 thereof and bearing sleeves 133—133 projecting inwardly from the side walls 122—122, reenforcing the openings 132—132.

The worm wheel F is arranged to be actuated by the hand wheel actuated worm element of the worm gear mechanism in a manner similar to the worm wheel B, hereinbefore described. The construction of the worm wheel F differs from the worm wheel B in that it has the hub portion thereof, which is indicated by 134, provided with projecting cylindrical flanges 150—150 at opposite sides thereof, which engage over and are journaled on the inner ends of the bearing sleeves 133—133. These overhanging flanges provide an effective seal against leakage from the housing of lubricating material used to lubricate the moving parts of the mechanism.

The rotary shaft G, which is coupled to the chain winding shaft of the hoisting means in a manner similar to that shown in Figures 1 to 5

inclusive, is provided with an enlarged portion 151 of square cross section, which slidingly fits within the opening 152, which is also of square cross section, provided in the hub portion of the worm wheel F. The openings 132—132 in the housing, through which the enlarged portion of the shaft G extends are of a diameter slightly greater than the diagonal dimension of the square portion 151 of the shaft to permit free rotation of the latter therein. The shaft G is thus, in effect, supported by the worm wheel, which is journaled on the bearing sleeves 133—133 of the housing. As will be evident, the shaft G is lengthwise displaceable in a manner similar to the shaft A, hereinbefore described, to relieve the worm gear mechanism and the housing of end thrust.

I claim:

In a chain winding mechanism for the hoisting chain means of the upper deck of a railway car, the combination with a rotatably supported chain winding shaft on said car extending lengthwise of the same; of a manually actuated worm gear mechanism for rotating said shaft mounted on the car, said mechanism including a worm wheel with which said shaft and worm wheel are rotatable in unison, said shaft having a freely slidable

slot and key connection with said worm wheel to permit lengthwise displacement of said shaft relative to the wheel; and fixed abutment means on the car engaging opposite ends of said shaft to oppose lengthwise displacement of the same.

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