

April 7, 1959

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GUIDE ROLLERS FOR LIFT TRUCK CARRIAGE

Filed Oct. 17, 1955

2 Sheets-Sheet 1

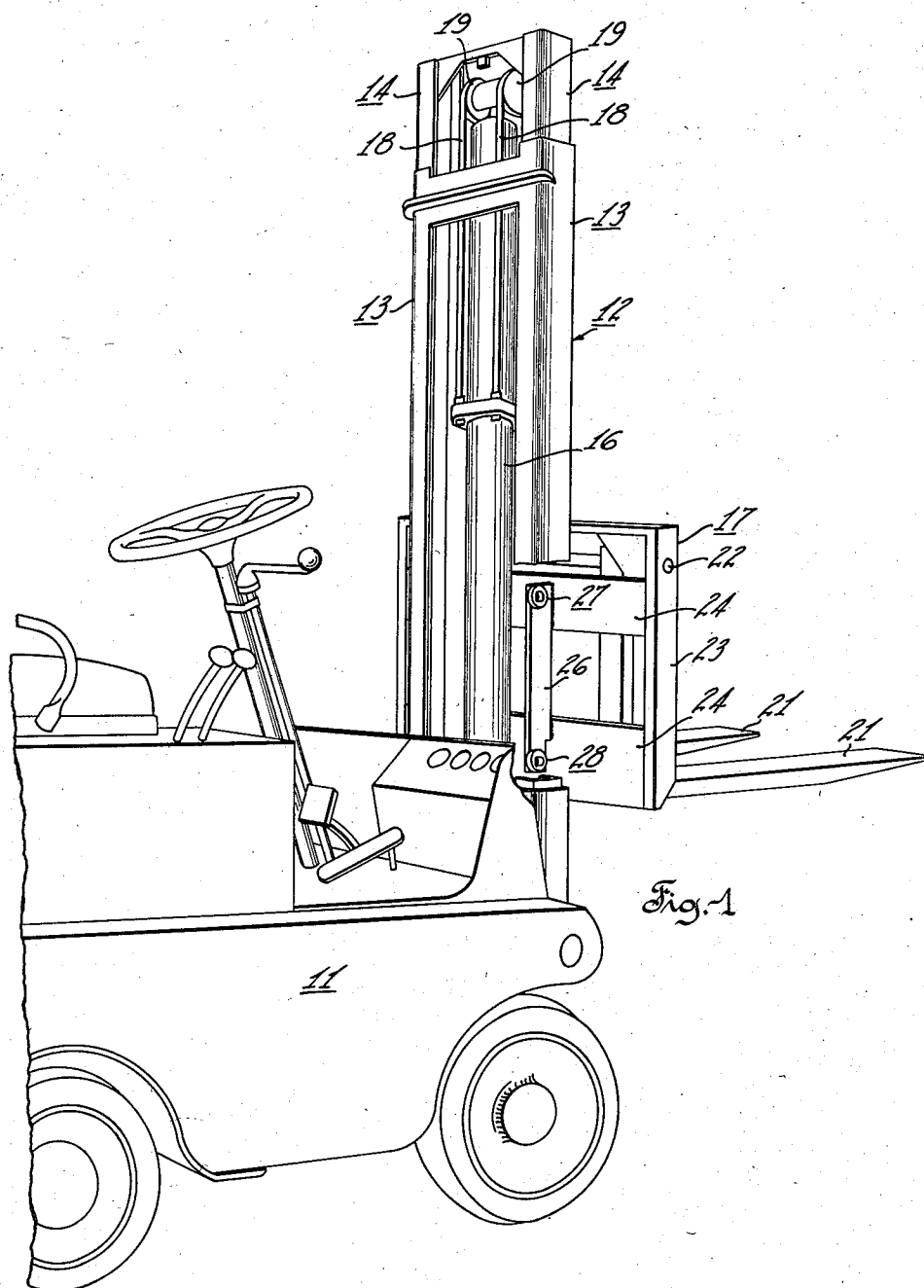


Fig. 1

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April 7, 1959

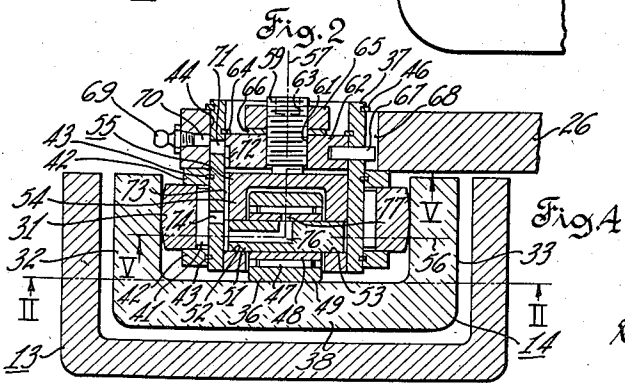
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GUIDE ROLLERS FOR LIFT TRUCK CARRIAGE

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Application October 17, 1955, Serial No. 540,757

5 Claims. (Cl. 308—6)

This invention relates to a lift truck of the type having a load carrying carriage which is mounted for vertical reciprocal movement on a pair of channel members of a mast, and more particularly to guide roller arrangements for reducing friction and improving performance of the carriage as it is raised and lowered on the mast.

In lift trucks of previous designs, rollers are mounted on the vertically shiftable carriage to engage the flanges of the channel members of the mast so as to prevent fore and aft tipping of the carriage; and additional rollers are employed to prevent lateral tilting of the carriage. One of such previous designs being shown in U.S. Patent No. 2,679,437, issued May 25, 1954. Good design dictates that the rollers taking the main load, that is, the rollers controlling fore and aft tipping of the carriage be placed as far apart as possible to reduce the load on the bearings and wear on the mast channel members. It is desirable also to place the rollers controlling lateral tilting of the carriage as far apart as possible so as to subject them to the least load possible and minimize the lateral tilting of the carriage. Thus for best results both sets of rollers would occupy the same locations. It is desirable to provide lubricating means for the rollers with the least number of fittings and passages so as to reduce cost of manufacture and time required for lubrication servicing. It is also highly desirable to provide adjusting mechanism for the side thrust rollers which is readily accessible and requires a minimum of time for adjustment.

It is a principal object of this invention to provide an improved roller assembly for transporting a carriage on channel members of a mast so as to produce a minimum of fore and aft tipping and a minimum of lateral tilting.

It is a further object of this invention to provide a combined fore and aft and side thrust roller assembly wherein the provision of adjustability of one roller with respect to the other does not cause impairment of the means of lubrication.

It is a further object of this invention to provide a lubrication system for each combined roller assembly wherein the side thrust roller and the fore and aft load roller are lubricated through a single grease fitting.

It is a further object of this invention to provide a readily accessible adjusting means for positioning the side thrust roller relative to the carriage.

These and other objects and advantages will be apparent from the following description and the accompanying drawings, in which:

Fig. 1 is a perspective view of a fork lift truck with the forks and carriage shown in a partly raised position and with the near channel members broken away to expose the combination guide roller assemblies of this invention;

Fig. 2 is a section view taken on line II—II of Fig. 4 and showing the side view of the guide roller assemblies;

Fig. 3 is a section view taken on line III—III of Fig. 2;

Fig. 4 is an enlarged section view taken on line IV—IV of Fig. 2; and

Fig. 5 is a section view taken on line V—V of Fig. 4. Referring to Fig. 1, a fork lift truck 11 carries a vertical mast assembly 12 at its forward end. The mast assembly includes relatively telescoping outer channel members 13 and inner channel members 14 and a hydraulic cylinder 16 which raises and lowers a carriage assembly 17 through chains 18 passing over a pair of pulleys 19.

The carriage assembly 17 has a pair of laterally spaced forks 21 carried by a pin 22 on the carriage frame 23. A pair of cross members 24 of the carriage frame 23 support a pair of vertically disposed frame members 26 which are secured, as by welding, thereto. The vertically disposed frame members or plates 26 each carry a pair of vertically spaced roller assemblies 27 and 28.

Referring to Figs. 2 and 3, each combined roller assembly has a main roller 31 disposed between the flanges 32 and 33 of the inner channel 14 and includes a side thrust roller 36 which is disposed within a hollow pin or pintle 37 on which main roller 31 is journaled. The roller 36 extends beyond the free end of pintle 37 so as to roll on the inner surface of the web portion 38 of the inner channel 14.

In Figs. 4 and 5 the guide roller assemblies are shown in greater detail. The main roller 31 is carried on the free end of the pintle 37 by a plurality of roller bearings 41. A pair of rings 42 are mounted on the pintle by snap rings 43 to prevent shifting of the roller 31 relative to the pintle 37. The pintle 37 is mounted in a bore 44 in frame members 26 and releasable fastening means, in the form of snap ring 46, are provided to releasably secure the pintle 37 to the carriage. The side thrust roller 36 includes a plurality of roller bearings 47 disposed between inner race 48 and outer race 49. The inner race 48 is supported by a pin 51 and pin 51 in turn is supported in bores 52 and 53 of the fork portions 54 presented by a clevis yoke or roller supporting member 55. Thus the side thrust roller 36 rotates on an axis 56 which is perpendicular to axis 57 on which main roller 31 rotates. The roller supporting member 55 is reciprocally mounted in the hollow portion of the pintle 37 defined by interior walls 58. Its position relative to the carriage may be adjusted along the axis 57 of the main roller by screwing the dog point set screw 59 into a drilled and tapped hole 61 formed in retainer 62. A hexagonal opening 63 is provided to receive a hexagonal headed wrench. The retainer is prevented from shifting axially away from the clevis yoke 55 by a snap ring 64. A jam nut 65 and a lock washer 66 lock the set screw 59 relative to the retainer 62 after proper adjustment has been selected.

As shown in Figs. 4 and 5, one end of a pin 67 extends through a drilled hole in pintle 37 into a slot 68 in the frame member 26 adjacent bore 44. The other end of pin 67 extends into a hole in the retainer 62 thereby preventing rotation of either the pintle or retainer relative to the carriage.

The rollers 31 and 36 are lubricated through a single grease fitting 69 which is secured in a hole 70 drilled through the rear of frame member 26. The hole 70 is in fluid communication with hole 71 drilled through the side of hollow pintle 37 and hole 71 is in turn in fluid communication with an axial slot or groove 72 in retainer 62. As shown in Fig. 4, retainer 62 and clevis yoke 55 are axially spaced from one another by set screw 59, however, the only escape for grease entering this space through groove 72 is groove 73 in the clevis yoke 55. Grease is forced through groove 73 thence into a radial hole 74 in pintle 37 to bearing rollers 41 and also grease is forced through groove 73 into a hollow space at the end of side thrust roller shaft 51, through L-shaped passage 76, and through hole 77 in inner race 48 to bearing rollers 47. Thus both the main roller 31 and the side

thrust roller 36 are lubricated through a single grease fitting thereby saving maintenance time and reducing initial cost of manufacture.

A total of four roller assemblies are used in the illustrated embodiment of this invention, the two upper roller assemblies 27 being identical to the two lower roller assemblies 28. Although having all four of the side thrust rollers 36 adjustable is desirable from the standpoint of insuring proper operation and simplifying the stocking of spare parts, satisfactory operation of the carriage would be achieved if only the side thrust rollers on one lateral side of the carriage were adjustable along the axes 56 of their associated main rollers 31.

This invention permits the side thrust rollers 36 to occupy maximum vertical spacing and thus when the carriage is loaded heavier on one lateral side than on the other, lateral tilting of the carriage is held to a minimum. Also with the maximum vertical spacing of the side thrust rollers 36 the carriage is less apt to jam in the inner mast channels 14 and friction losses are substantially less than in previous arrangements.

It should be understood that it is not intended to limit the invention to the particular forms and details described hereinabove and that the invention includes such other forms and modifications as are embraced by the scope of the appended claims.

It is claimed and desired to secure by Letters Patent:

1. In a mast and carriage structure for a lift truck, guide means for shiftably carrying the carriage along the mast comprising: a pintle carried by said carriage and having interior walls defining a cavity adjacent its free end; a main roller journaled on said pintle for rotation about a first axis; a supporting member disposed within said cavity; a side thrust roller mounted on said supporting member for rotation on a second axis perpendicular to said first axis and having a circumferential portion extending beyond said free end of said pintle; means interposed between said supporting member and carriage for adjusting said side thrust roller in the direction of said first axis, and lubricating means including a lubricant insert fitting secured to said carriage and passages connecting said fitting in fluid communication with said rollers.

2. A roller assembly for transferring fore and aft and lateral thrusts between relatively reciprocable first and second guide members, one of which has a channel formed therein presenting spaced parallel faces and a transverse surface, said roller assembly comprising: a hollow pintle nonrotatably and nonshiftably mounted on the other of said guide members; a main roller mounted on said pintle for rotation about an axis and disposed in rolling thrust transmitting relation to said parallel faces; a supporting member mounted within said pintle for adjustment in the direction of said axis; means for adjustably positioning said supporting member relative to said pintle in the direction of said axis; a pin mounted on said supporting member in transverse relation to said axis; a side thrust roller rotatably mounted on said pin and disposed in rolling thrust transmitting relation to said transverse surface; antifriction bearings operatively interposed between said main roller and pintle and between said side thrust roller and pin, respectively; a grease fitting secured to said other of said guide members; and lubricant passages formed in said other of said guide members, pintle, supporting member and pin to connect said grease fitting in lubricating communication with said antifriction bearings.

3. A roller assembly for transferring fore and aft and lateral thrusts between relatively reciprocable first and second guide members, the first of said guide members having a channel formed therein presenting spaced parallel surfaces and a transverse surface, said roller assembly comprising: a hollow pintle rigidly mounted on said second guide member; a main roller mounted on said pintle for rotation about an axis and disposed in rolling thrust transmitting relation to said parallel surfaces; a clevis yoke mounted within said pintle and adjustable in the direction of said axis; a retaining member secured to said pintle; adjusting means for positioning said clevis yoke relative to said retaining member in the direction of said axis; a pin mounted on said clevis yoke in transverse relation to said axis; a side thrust roller rotatably mounted on said pin and disposed in rolling thrust transmitting relation to said transverse surface; antifriction bearings operatively interposed between said main roller and pintle and said side thrust roller and pin, respectively; a lubrication fitting on said second guide member; and passage means formed in said pintle, clevis yoke, retaining member, and pin placing said lubrication fitting in simultaneous communication with said antifriction bearings.

4. In a mast and carriage structure for a lift truck, guide means for shiftably carrying and carriage along the mast comprising: a hollow pintle presenting inner and outer cylindrical surfaces; a main roller mounted on said outer surface of said pin; a clevis yoke member supported on said inner surface of said pin for axial movement relative thereto; a pin mounted on said pintle on an axis perpendicular to the axis of said pintle; a side thrust roller mounted on said pin for rotation about the axis of said pin and having a circumferential portion extending beyond one end of said pintle; antifriction bearings interposed between said outer cylindrical surface and main roller and said side thrust roller and pin, respectively; releasable fastening means securing the other end of said pintle to said carriage; means interposed between said clevis yoke member and said pintle for adjusting said side thrust roller in the direction of said axis of said pintle; a lubrication fitting mounted on said carriage; and passage means placing said fitting in simultaneous communication with said antifriction bearings.

5. A roller assembly for transferring fore and aft and lateral thrust between relatively reciprocable first and second guide members comprising: a pintle carried by said first guide member and having interior walls defining a cavity adjacent to its free end; a main roller journaled on said pintle for rotation about a first axis; a supporting member disposed within said cavity; a side thrust roller rotatably mounted on said supporting member for rotation on a second axis perpendicular to said first axis and having a circumferential portion extending beyond said free end of said pintle; a lubrication fitting mounted on said first guide member; and passage means formed in said first guide member, pintle and supporting member placing said fitting in simultaneous communication with bearing surfaces of both rollers.

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