

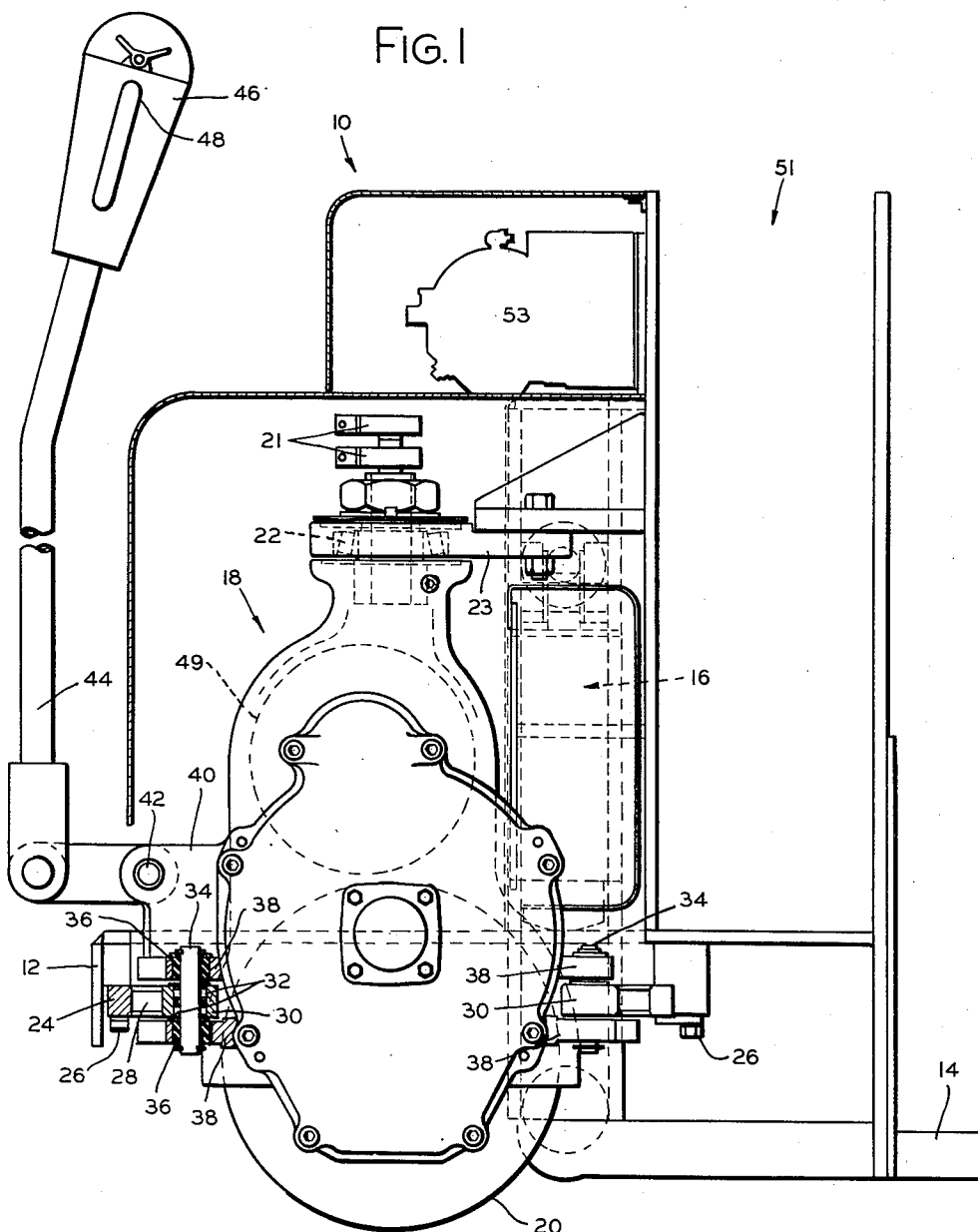
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R. H. GARDNER  
HAND LIFT TRUCK

2,762,444

Filed Nov. 25, 1953

2 Sheets-Sheet 1



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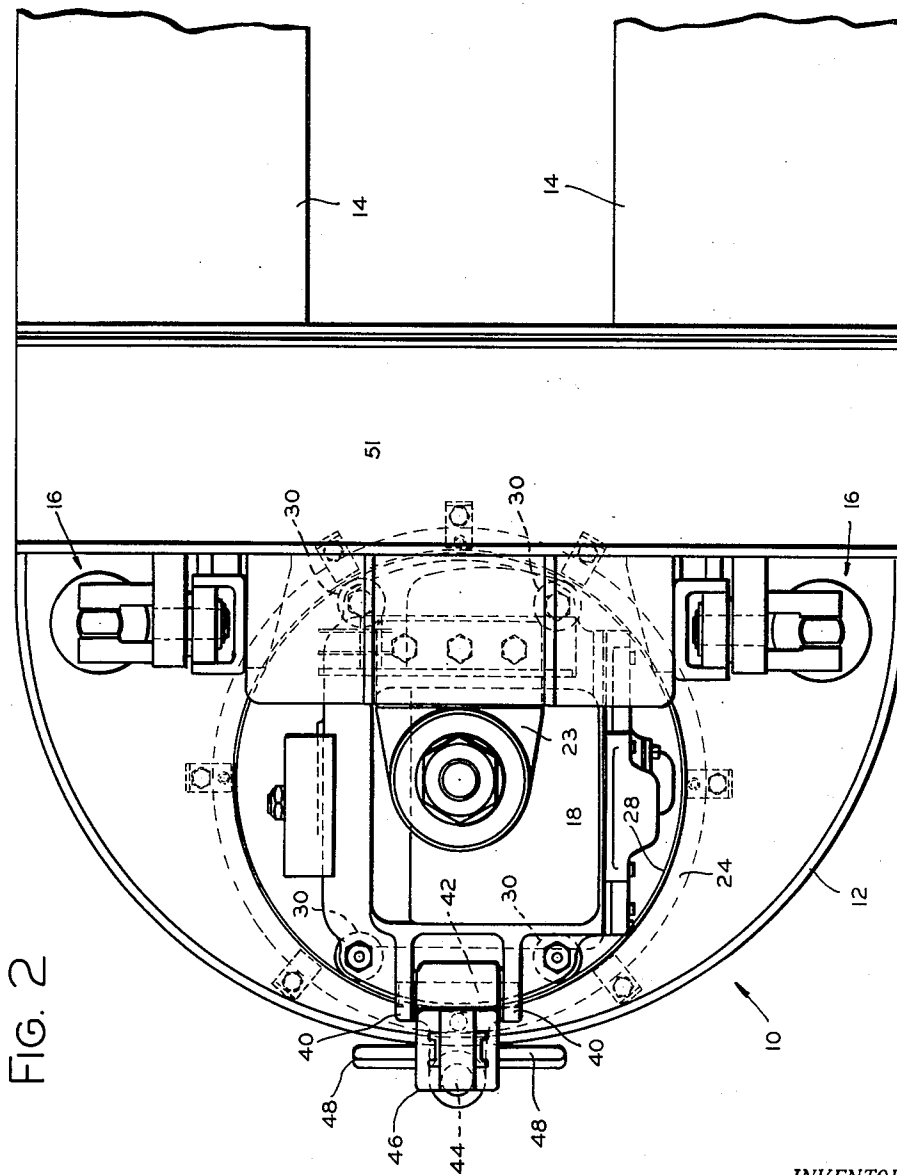
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## HAND LIFT TRUCK

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5 Claims. (Cl. 180—13)

My present invention relates generally to power operated hand lift trucks, and, more specifically, to drive head mounting means therefor.

Presently known powered hand lift trucks commonly are comprised of the primary elements of a main frame and a drive head rotatably mounted therein about a vertical axis. The drive head is supported on the drive wheel of the truck and generally carries the prime mover means for powering the truck. A handle is attached to the drive head and is adapted to be manually swung in a horizontal plane for pivoting the drive head and steering the vehicle.

As will be realized by those skilled in the art, the direction of drive of a hand lift truck is continually changed while the truck is being positioned to engage or deposit a load. Consequently it is important that the mounting between the truck frame and drive unit be of such construction that a minimum of effort is required to pivot the steering head. Also it is important to eliminate "chatter" between the drive unit and the frame such as sometimes occurs with conventional constructions.

It is an object of my present invention to provide means for mounting a drive head in a truck frame which means will permit limitary fore and aft floating movement of the drive unit relative to the frame so as to provide free turning of the drive head and substantially eliminate chatter of the head during changes in direction of drive of the truck.

A further object of my invention is the provision of a construction for mounting a drive head in a truck frame which is low in cost and which allows moderate manufacturing eccentricities and tolerances without adverse effect on its operation.

In accomplishing the above objects, I form the main frame with an internal track having the wall thereof extending vertically. Circumferentially spaced rollers are mounted about vertical axes in resilient means carried by the drive head and the rollers are disposed in engagement with the track of the main frame for rotatably mounting the drive head in the latter. The resilient floating mounting of the rollers serves to eliminate chatter of the drive unit during changes in direction of drive of the truck.

It is a further feature of my present invention that the resilient means, in which the rollers are mounted, are pre-stressed during assembly of the machine, thereby improving the elimination of undesirable chatter. Pre-stressing is obtained by forming the diameter of the track smaller than the diameter of a circle which is tangent to the outer peripheries of the rollers when the drive head unit is demounted from the main frame. As a result, the rollers, when assembled in engagement with the track, are positioned radially inwardly of their normal free positions, and the desired stress in the resilient mountings is thereby created.

Now, in order to acquaint those skilled in the art with the manner of constructing and using drive head mounting means in accordance with the principles of my present invention, I shall describe in connection with the accom-

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panying drawings a preferred embodiment of my invention.

In the drawings:

Figure 1 is a partial side elevational view partially in section of a hand lift truck with which my present invention is embodied; and

Figure 2 is a partial plan view of the hand lift truck of Figure 1 with the cover and other parts above the drive head removed.

Referring now to the drawings, there is indicated generally by the reference numeral 10 a hand lift truck which comprises a main frame 12 and load supporting means 14 projecting forwardly therefrom. The load supporting means 14 in the specific embodiment shown includes a pair of horizontal fork frames vertically movable relative to the body portion 12 through the actuation of a pair of hydraulic piston and cylinder assemblies 16 (acting through conventional linkages which are not shown in the drawing) arranged respectively adjacent the sides of the truck 10. The load supporting forks 14 at their forward ends are supported on extensible ground engaging rollers in a manner which is well known in the art.

Rotatably mounted, about a vertical axis, in the main frame 12 is a drive head unit, indicated generally by the reference numeral 18, which is supported on a ground engaging drive wheel 20. The drive wheel 20 is powered by an electric motor 49 which is enclosed in the drive head unit 18. The electric motor is adapted to have driving connection with the drive wheel 20 through suitable gearing, and is adapted to have electrical connection with a battery (not shown) carried by the truck 10 through a pair of clock-like springs 21 which are arranged at the upper end of the drive head unit 18. The battery may be located in the space 51 and electrical connections made from the battery terminals to springs 21 respectively. Since the drive means of the hand lift truck forms no part of my present invention, it is believed that the foregoing description thereof is sufficient for purposes of the present disclosure.

The hand lift truck 10 may include a motor driven pump 53 having suitable electrical and hydraulic connections (not shown) for operating hydraulic devices on the truck such as piston and cylinder assemblies 16.

The upper end of the drive head unit 18 is secured in the inner race of a tapered roller bearing assembly 22 which preferably is of the self aligning type and which is arranged immediately below the electrical conducting springs 21. The outer race of the assembly 22 is secured in a horizontal plate member 23 suitably bolted to the main frame 12. The means of my present invention for guiding and restricting fore and aft movement of the drive head unit 18 in the main frame 12 comprises a horizontal circular ring member 24 which is non-rotatably secured to the main frame 12 by means of a plurality of circumferentially spaced bolts 26. The internal diameter or vertical wall of the ring 24 defines a track 28 which is engageable by a plurality of circumferentially spaced rollers 30. The rollers 30 number four in the specific embodiment of the invention disclosed herein and are mounted on vertical needle bearings 32 which surround vertical supporting shafts 34. The upper and lower ends of the shafts 34 have resilient ring members 36 disposed thereabout which are fixed in vertically spaced bracket members 38 extending radially and horizontally from the drive head unit 18. The shafts 34 are maintained in proper position by means of conventional washers and retainer rings.

The resilient mounting of the shafts 34 permits limitary fore and aft floating movement of the drive head unit 18 relative to the main frame 12 of the truck 10 so as to thereby reduce chatter of the drive head unit 18 during changes in direction of drive of the truck. In order to further reduce and substantially eliminate chatter, the re-

silient members 36 are preferably prestressed during assembly of the drive head unit 18 within the main frame 12. Such pre-stressing is conditioned by forming the diameter of the track 28 smaller than the diameter of a circle which is tangent to the outer peripheries of the rollers 30 when the drive head unit 18 is demounted from the main frame 12. Then, the rollers 30 as they are positioned into engagement with the track, are moved radially inwardly of their normal free positions, and the desired stress in the resilient mountings is thereby attained.

The drive head unit 18 is also formed with a pair of horizontally spaced vertical flange members 40 which provide support for a horizontal pin member 42. The pin member 42 has secured thereon the lower end of a normally upwardly extending steering handle 44 which has a control head 46 at its upper end with hand grips 48 extending laterally therefrom. The details of construction and operation of the control head 46 will not be described herein since it forms no part of my present invention. The handle 44 may be swung in a vertical plane from the position shown in Figure 1 to a substantially horizontal position, although, normally, means are provided for biasing the handle 44 toward a vertical position. The handle 44 may be grasped at the hand grips 48 and swung in a horizontal plane for effecting rotary movement of the drive unit 18 within the main frame 12 for steering the vehicle.

From the foregoing description, it will be realized by those skilled in the art that I have provided drive head mounting means which is effective in reducing the transmission of shocks between the drive head unit and the complementary portions of a hand lift truck. Thus, wear of the truck is reduced and the truck becomes easier and less tiresome to operate.

While I have described and illustrated herein a preferred form of my invention which employs rollers mounted in resilient material, it will be apparent to those familiar with machines of this type that other anti-friction means, such as balls, suitably mounted in resilient means may be employed if desired.

Thus, while I have shown and described what I believe to be a preferred embodiment of my present invention, it will be understood that various rearrangements and modifications may be made therein without departing from the spirit and scope of my invention.

I claim:

1. In a hand lift truck having a main frame and a drive head unit including a ground engaging drive wheel, means for mounting the drive head unit in the main frame for rotation about a vertical axis, and said mounting means including anti-friction means mounted in resilient means which permits limited fore and aft floating movement of the drive head unit relative to the main frame so as to reduce chatter of the unit during changes in direction of drive of the truck.

2. In a hand lift truck having a main frame and a drive

head unit including a ground engaging drive wheel, a plurality of rollers for mounting the drive head unit in the main frame for rotation about a vertical axis, and said rollers being floatingly mounted in resilient means so as to reduce chatter of the drive head unit during changes in direction of drive of the truck.

3. In a hand lift truck having a main frame and a drive head unit including a ground engaging drive wheel, the main frame having an internal track with the wall thereof extending vertically, circumferentially spaced rollers rotatably mounted in the drive head unit about vertical axes, said rollers engaging the track of the main frame whereby the unit is mounted in the main frame for rotation about a vertical axis, and said rollers being floatingly biased radially outwardly so as to reduce chatter of the unit during changes in direction of drive of the truck.

4. In a hand lift truck having a main frame and a drive head unit including a ground engaging drive wheel, said main frame having an internal track with the wall thereof extending vertically, circumferentially spaced rollers mounted about vertical axes in resilient means carried by said drive head unit, said rollers engaging the track of the main frame whereby said unit is mounted in said main frame for rotation about a vertical axis, and the resilient mounting of said rollers serving to permit limited fore and aft floating movement of said unit relative to said main frame so as to reduce chatter of said unit during changes in direction of drive of the truck.

5. In a hand lift truck having a main frame and a drive head unit including a ground engaging drive wheel, circumferentially spaced rollers mounted about vertical axes in resilient means carried by said drive head unit, said main frame having an internal track with the wall thereof extending vertically, the diameter of said track being less than the diameter of a circle which is tangent to the outer peripheries of the rollers when the drive head unit is demounted from the main frame, said rollers serving to engage the track of the main frame so that said unit may be mounted in said main frame for rotation about a vertical axis, said rollers when assembled in engagement with said track being positioned radially inwardly of their normal free positions for stressing the resilient mountings, and the stressed resilient mountings of said rollers serving to permit limited fore and aft floating movement of said unit relative to said main frame so as to reduce chatter of said unit during changes in direction of the drive of the truck.

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