April 10, 1951 E. E. ROBINS ET AL 2,548,846

CHAIN HOIST

Filed Nov. 1, 1947 2 Sheets-Sheet 1

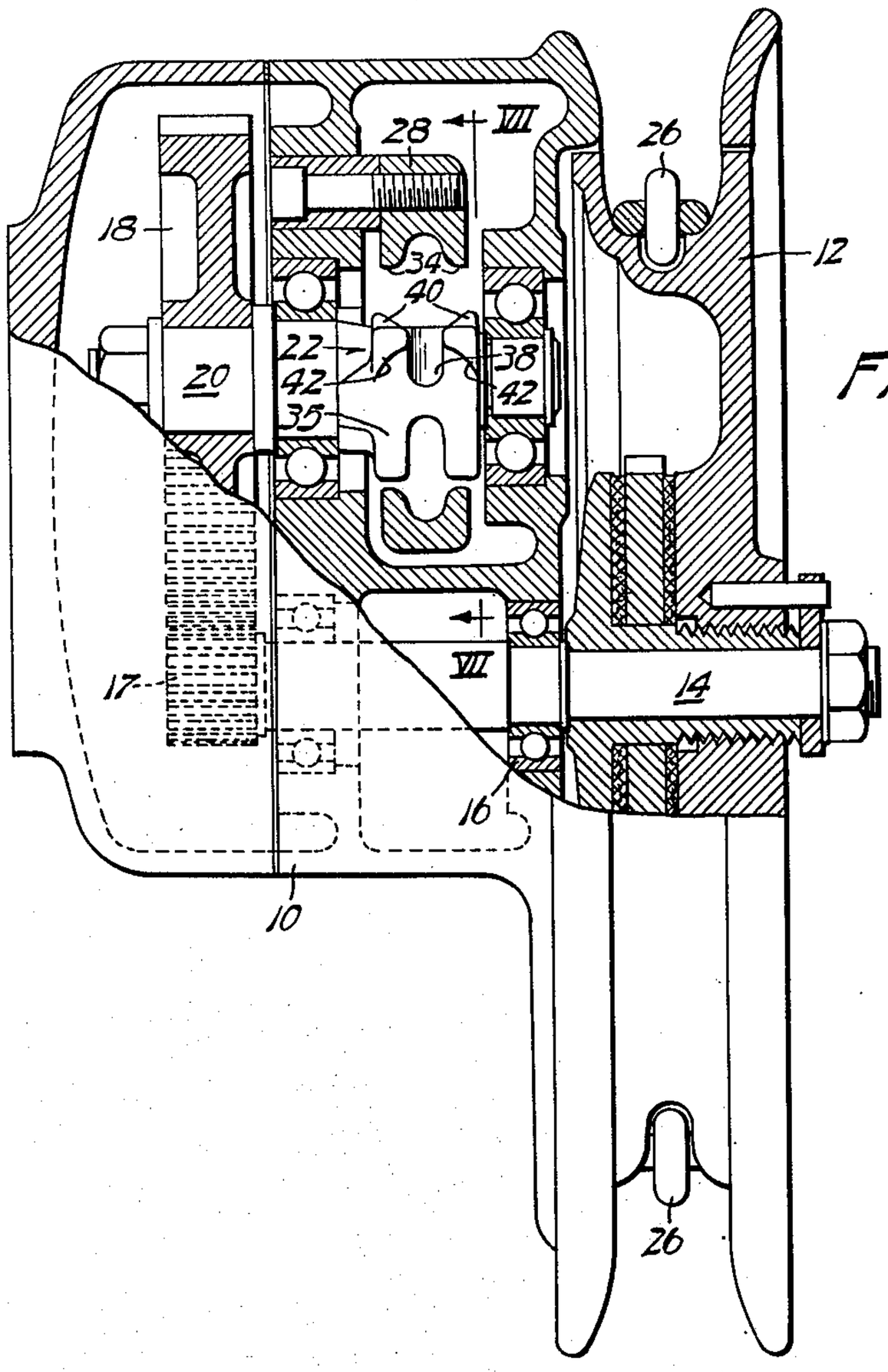

Fig. 1.

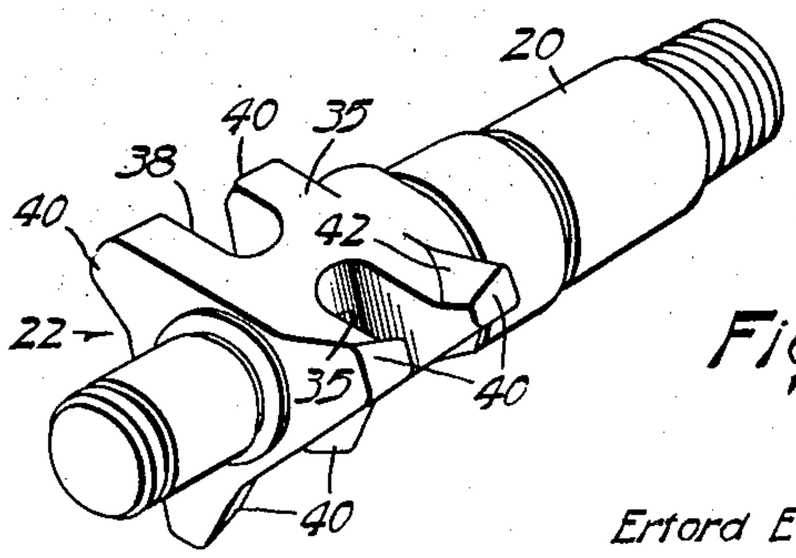

Fig. 2.

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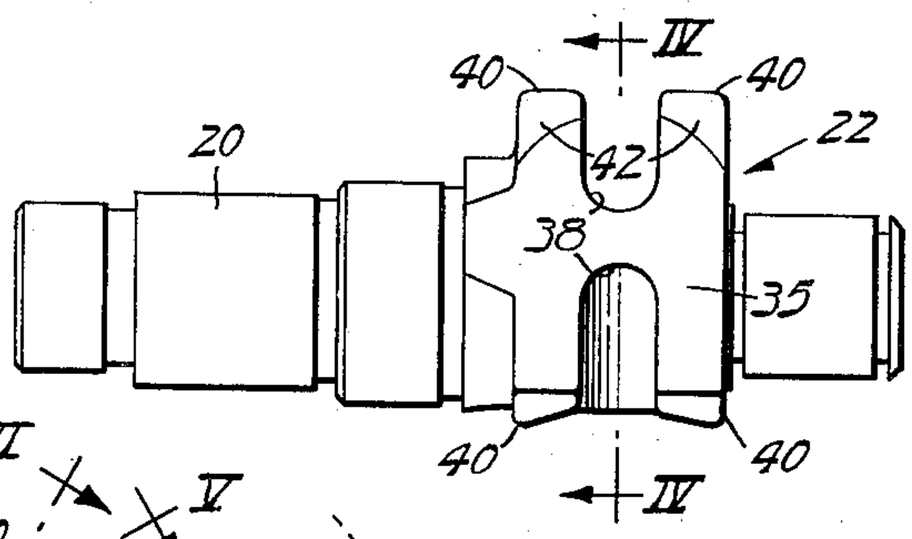
2 Sheets-Sheet 2

Fig. 3.



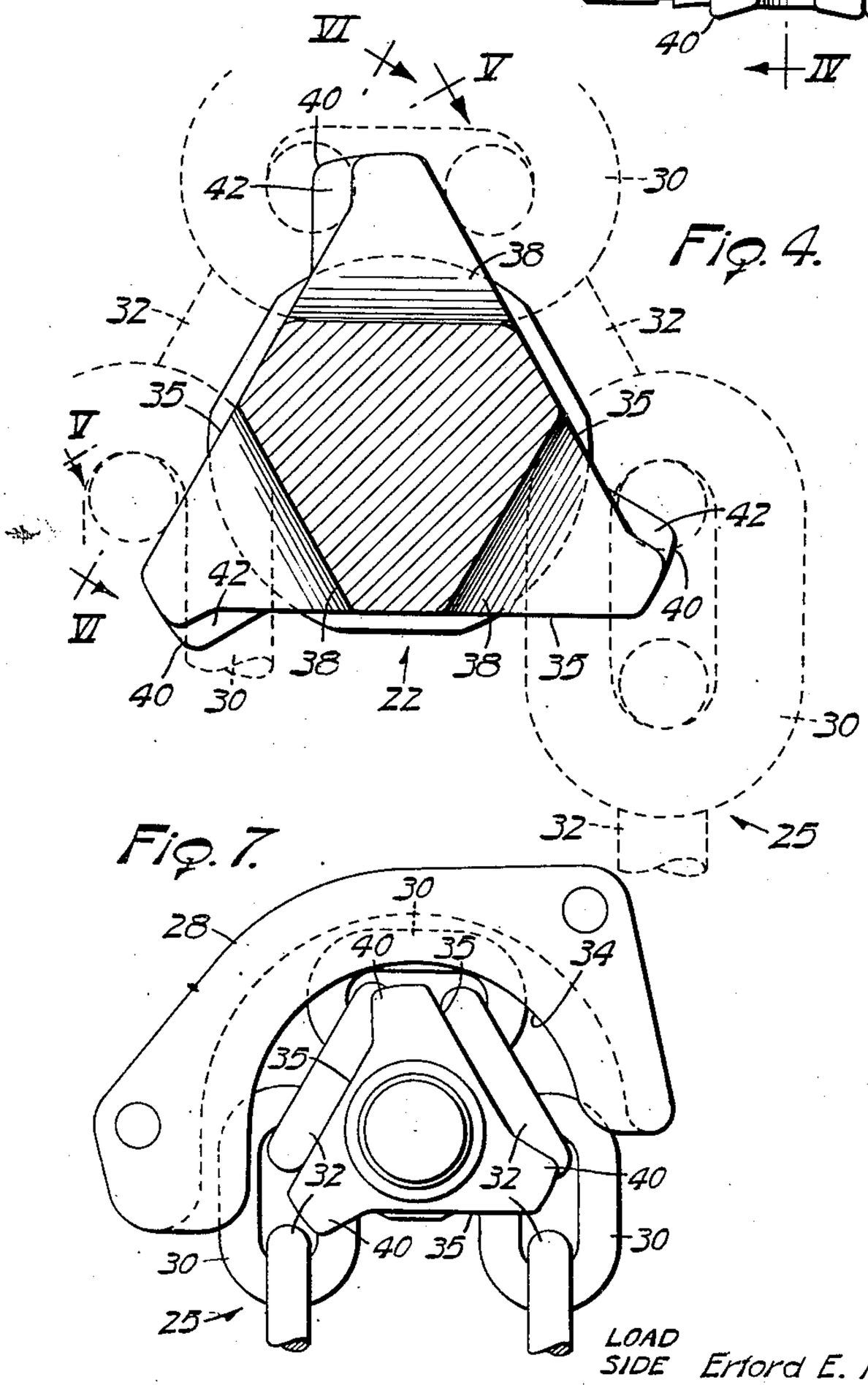


Fig. 4.

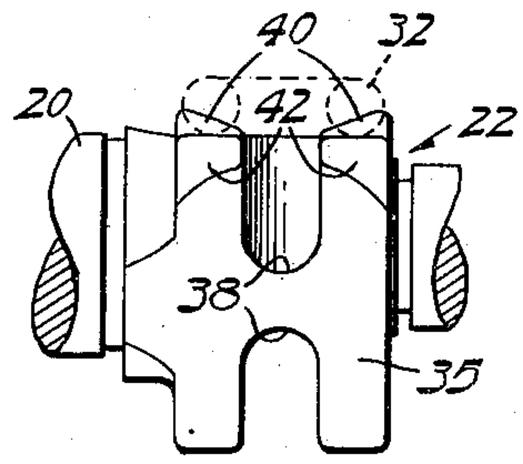


Fig. 5.

Fig. 7.

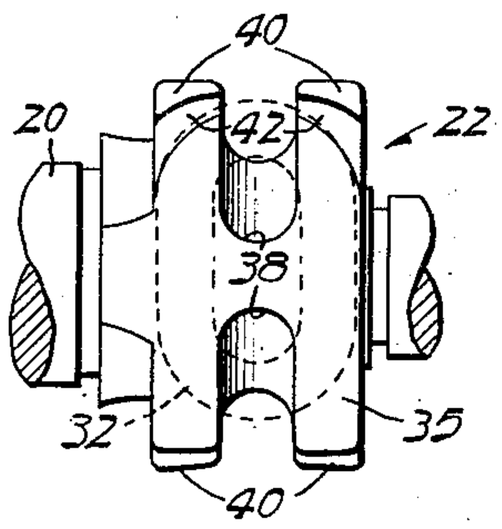


Fig. 6.

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CHAIN HOIST

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Application November 1, 1947, Serial No. 783,486

7 Claims. (Cl. 254—167)

1

This invention relates to chain hoists, such as industrial hoists which carry their loads through welded link type chains which reeve over load lift wheels carried by gear driven shafts. In this type hoist the load lift shaft is geared either to an electric motor or to a shaft which is keyed to a sprocket driven by a manually pulled endless chain. More specifically the invention relates to improvements in such hoists whereby it becomes practicable to design such hoists to embody minimum gear reduction ratios between the driving shaft and the load lift shaft by reducing the diameter limitations on the load lift wheels when employing chains of any given size of link.

Prior load lift wheels for use in connection with welded link style load chains have been successfully designed to operate with as low as five chain link receiving pockets formed into the peripheries thereof, but it has been found to be extremely difficult and expensive prior to the present invention to forge such lift wheels with as low as three pockets therein, because of the great dimensional accuracy which is required in a wheel forging having link pockets of previous style. This is because the relative fit of the load chain links and the wheel pockets becomes extremely critical in small size lift wheels, and severe secondary forces are developed in training of the load chain over a small lift wheel having conventionally shaped link pockets therein, resulting in rapid wearing of the chain and chain guide and wheel parts. Also, prior lift wheel pocket designs have proved to be inadequate when used in small size lift wheels to accommodate service-distorted chain, such as invariably results from wearing and/or stretching of the load chain under service conditions.

It is an object of the present invention to provide an improved design for chain hoist lift wheels, whereby such wheels may be constructed to lesser diameters when handling load chains having links of the same size and type, while permitting the load chain to train freely over the load wheel.

Another object of the invention is to provide an improved load chain link pocket configuration in chain hoist load lift wheels and the like, whereby to provide for improved "floating" of the load chain into load lifting geared relation with the hoist frame chain guide element and the load lift wheel, especially in connection with relatively small diameter lift wheels.

Another object of the invention is to provide an improved design for chain link pockets in chain hoist load lift wheels, whereby the lift

2

wheels are adapted to be manufactured by simplified and less expensive processes compared to the manufacture of corresponding lift wheels of the prior art.

Still another object of the invention is to provide an improved design especially for small diameter load lift wheels of the type referred to hereinafter, whereby such whels will tolerate somewhat oversize chain linke and/or misshapen chain links without relative grinding and undue wearing of the wheel and chain link parts.

Other objects and advantages of the invention will appear from the specification hereinafter.

In the drawing:

Fig. 1 is a fragmentary sectional view through a chain hoist mechanism embodying a load lift wheel of the present invention;

Fig. 2 is a perspective of the load lift shaft and wheel unit thereof;

Fig. 3 is a side elevation of the load lift shaft and wheel unit;

Fig. 4 is a sectional view taken along line IV—IV of Fig. 3, on an enlarged scale, showing the hoist load lift chain trained thereon;

Fig. 5 is a side elevational view of the load lift wheel, taken as along line V—V of Fig. 4;

Fig. 6 is a side elevational view of the load lift wheel, taken as along line VI—VI of Fig. 4; and

Fig. 7 is a fragmentary sectional view of the load lift wheel and chain guide portions of the hoist mechanisms, taken along line VII—VII of Fig. 1.

The invention relates particularly to hoists which employ chain of the type comprising interlooped links formed by bending and welding wire stock into oval link form, such as is illustrated in Figs. 4 and 7.

The invention is illustrated in Fig. 1 in connection with a chain hoist comprising generally a casing **10** which rotatably mounts a hand chain wheel **12**. The hand wheel shaft **14** is supported in the casing **10** by means of bearings **16**, and is geared at its inner end through means of gears **17** and **18** to the hoist load lift shaft **20**. The shaft **20** carries the load lift wheel **22**, over which trains the load lift chain as is indicated at **25** (Figs. 4 and 7). The hoist casing will of course be fitted with a hook whereby it may be suspended at any elevation; and it will be understood that the load lift chain **25** will carry at its lower end a suitable hook device for attachment of the load to be lifted. Thus, upon rotation of the wheel **12**, as by pulling upon an endless hand chain **26** which is trained over the wheel **12** in mesh with the peripheral pockets

thereof, the load lift wheel will be driven so as to elevate the load at a reduced speed compared to the movement of the hand chain, thereby acquiring great mechanical advantage and permitting a heavy load to be lifted in response to relatively light pulling upon the hand chain.

Thus, the hoist mechanism which has been described hereinabove is of the general type that is disclosed for example in U. S. Patent No. 2,243,361, and as is illustrated therein, a chain guide member in the form of a grooved metal piece is preferably mounted upon the interior of the hoist casing **10**, as is indicated at **28** in Figs. 1 and 7.

The chain guide member **28**, is designed to receive the edgewise disposed links **30** of the load chain (Figs. 4 and 7) in the grooved portion of the chain guide, while the alternate flatwise-disposed links **32** of the load chain bear against the edge portions **34—34** (Fig. 1) of the chain guide member and are biased thereby into flatwise seated relation against the land portions **35** of the lift wheel **22**, to be carried around the axis of the shaft **20** in sliding relation against the chain guide surfaces **34—34**.

It is a particular feature of the present invention that the land portions **35** of the load lift wheel **22** are generally flat surfaces in planes offset from but extending parallel to the axis of rotation of the wheel. However, the land surfaces **35** are interrupted and cut away centrally at the opposite ends thereof as indicated at **38**, to accommodate therein the edgewise-disposed links of the load chain which interconnect the flatwise-disposed links (Figs. 4 and 7). Also, the otherwise flat surface configurations of the land surfaces **35** are interrupted at the trailing end portions thereof, when considered with respect to the direction of rotation of the wheel **22** when lifting a load, by a raised abutment **40** at each side of the land formation. As shown more clearly in Figs. 2–3–6, the abutments **40—40** at opposite sides of each land formation are inwardly faced as indicated at **42** so as to complement the curved end form of the flatwise-disposed chain links **32** as they are received by the flat land formations **35** of the lift wheel and pressed thereagainst by the action of the chain guide **28**.

Thus, it will be appreciated that the abutment portions **40** of the lift wheel **22** will thereby engage against the trailing end portion of each of the flatwise-disposed load chain links as they train successively over the lift wheel **22** whenever the latter is driven through means of the gearing **17—18** to rotate so as to lift a load. The number of lands formed on the lift wheel will of course depend upon the speed reduction ratio prescribed between the driver shaft and the load lift chain, taking into consideration the speed reduction ratio of the gear train **17—18**. Therefore, it will be understood that although in the present drawing the load lift wheel **22** is illustrated to be divided into three flat link receiving land portions, the wheel may be formed with any other desired number of land portions as may be required.

Thus, it will be appreciated that in the case of the present invention the load lift wheel member of the hoist mechanism presents to the oncoming chain links of the load chain, as the load is being lifted, a series of flat land surfaces which are bounded at their trailing end portions with raised abutments shaped to complement the trailing end portions of the links as they are forced

by the pulling of the load and by the pressure of the chain guide element to lie in snug-fitting flatwise relation against the land surfaces **35**; while the raised abutments **40—40** prevent the links **32** from sliding in endwise direction from the land surfaces. Thus, the raised abutments **40—40** restrain the flat links **32** only against sliding in endwise direction in response to the pull of the load, while the links are relatively free to move laterally relative to the land surfaces, wherefor they may "float" into properly aligned relation upon the wheel **22** under the guiding influence of the chain guide element **28** and of the pull of the load forces. Because the load lift wheel exerts no lateral guiding forces on the chain links except at the trailing end portion of each land surface, there is no forcible "grinding" of the load chain into meshing connection with the wheel **22** and the chain guide **28**, such as is the case in connection with prior art load wheel design including full length chain link pockets and the like.

It is another particular feature of the present invention that the load lift wheel design thereof facilitates manufacture of the wheel by simpler and less expensive manufacturing processes compared to the processes required in manufacture of load lift wheels of the prior chain link pocket type. For example, whereas such prior art type wheels must of necessity be manufactured either by complicated multi-die forging or machining processes to abnormally close tolerances, the wheel of the present invention may be forged by simpler forging operations or may be machined off by simple milling operations to produce the flat land surfaces **35** which are bounded at only one end and therefore involve no lateral tolerance measurements.

What is claimed is:

1. In a chain hoist, in combination, a load lift wheel and a chain guide device mounted upon said hoist in relatively spaced relation and so arranged as to cooperate to guide a load hoisting chain to train between the load lift wheel and the guide device, said load lift wheel comprising a member having a series of generally flat land portions extending peripherally of the wheel, each of said land portions being adapted to receive in flatwise-disposed relation thereagainst successive alternately flatwise disposed links of the load chain as the latter trains around the wheel, said land portions being centrally grooved at opposite ends thereof to accommodate the alternate edgewise disposed load chain links which interconnect the flatwise disposed links, said land surfaces terminating in upstanding abutment portions at the trailing end portions of said land surfaces in view of the direction of wheel rotation when lifting a load, said abutment portions being shaped to complement and bear against the trailing end portions of the flatwise disposed chain links.

2. In a chain hoist, a load lift wheel rotatably mounted upon said hoist to receive a welded link type hoist load chain to reeve around the load lift wheel, said load lift wheel having a series of generally flat land portions extending peripherally thereof, each of said land portions being adapted to receive in flatwise disposed relation thereagainst successive alternately flatwise-disposed links of the load chain as the latter trains around the wheel, said land portions being centrally grooved at opposite ends thereof to accommodate the alternate edgewise disposed load chain links which interconnect the flatwise disposed links, said land surfaces terminating in upstanding

abutment portions at the trailing end portions of said land surfaces in view of the direction of wheel rotation when lifting a load, said abutment portions being shaped to complement and bear against the trailing end portions of the flatwise disposed chain links.

3. In a chain hoist, a load lift wheel mounted upon said hoist to receive a welded link type hoist load chain to reeve around the load lift wheel, said load lift wheel having a series of flat land portions extending peripherally thereof, each of said land portions being adapted to receive in flatwise disposed relation thereagainst successive alternately flatwise disposed links of the load chain as the latter trains around the wheel, said land portions being centrally grooved at opposite ends thereof to accommodate the alternate edgewise disposed load chain links which interconnect the flatwise disposed links, said land surfaces terminating in upstanding abutment portions at the trailing end portions of said land surfaces in view of the direction of wheel rotation when lifting a load, said abutment surfaces being frontally shaped to bear against the trailing end portions of the flatwise disposed links.

4. In a chain hoist, in combination, a load lift wheel and a chain guide device mounted upon said hoist in relatively spaced relation and so arranged as to cooperate to guide a load hoisting chain to train between the load lift wheel and the guide device, said load lift wheel comprising a member having a series of generally flat land portions extending peripherally of the wheel, each of said land portions being adapted to receive in flatwise-disposed relation thereagainst successive alternately flatwise disposed links of the load chain as the latter trains around the wheel, said land portions being centrally grooved at opposite ends thereof to accommodate the alternate edgewise disposed load chain links which interconnect the flatwise disposed links, said land surfaces terminating in upstanding abutment portions at the trailing end portions of said land surfaces in view of the direction of wheel rotation when litfing a load, said abutment portions being shaped to complement and bear against the trailing end portions of the flatwise disposed chain links, said guide device comprising a member centrally grooved to straddle the edgewise disposed chain links and having opposite side portions extending to bear against the flatwise disposed links for biasing the latter against said wheel land portions.

5. In a chain hoist, a load lift wheel rotatably mounted upon said hoist to receive a welded link type hoist load chain to reeve around the load lift wheel, said load lift wheel having only three generally flat land portions comprising the complete peripheral extension thereof, each of said land portions being adapted to receive in flatwise disposed relation thereagainst successive alternately flatwise-disposed links of the load chain as the latter trains around the wheel, said land portions being centrally grooved at opposite ends thereof to accommodate the alternate edgewise disposed load chain links which interconnect the flatwise disposed links, said land surfaces terminating in upstanding abutment portions at the trailing end portions of said land surfaces in view of the direction of wheel rotation when lifting a load, said abutment portions being shaped to complement and bear against the trailing edge portions of the flatwise disposed chain links.

6. In a chain hoist, a load lift wheel mounted upon said hoist to receive a welded link type hoist load chain to reeve around the load lift wheel, said load lift wheel having a series of less than five generally flat land portions comprising the complete peripheral extent thereof, each of said land portions being adapted to receive in flatwise disposed relation thereagainst successive alternately flatwise disposed links of the load chain as the latter trains around the wheel, said land portions being centrally grooved at opposite ends thereof to accommodate the alternate edgewise disposed load chain links which interconnect the flatwise disposed links, said land surfaces terminating in upstanding abutment portions at the trailing end portions of said land surfaces in view of the direction of wheel rotation when lifting a load, said abutment portions being shaped to bear against the trailing end portions of the flatwise disposed chain links.

7. In a chain hoist, a load lift wheel mounted upon said hoist to receive a welded link type hoist load chain to reeve around the load lift wheel, said load lift wheel having a series of flat land portions extending peripherally thereof, each of said land portions being adapted to receive in flatwise disposed relation thereagainst successive alternately flatwise disposed links of the load chain as the latter trains around the wheel, said land portions being centrally grooved to accommodate the edgewise disposed links which interconnect consecutive flatwise disposed links, said land surfaces terminating in upstanding abutment portions at the trailing end portions of said land surfaces in view of the direction of wheel rotation when lifting a load to maintain the flatwise disposed links thereon against sliding therefrom in endwise direction.

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The following references are of record in the file of this patent:

UNITED STATES PATENTS

Number	Name	Date
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