United States Patent

[11] **3,618,898**

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[54] **WINCH**
1 Claim, 8 Drawing Figs.

[52] **U.S. Cl.** **254/187,** 308/122, 74/425
[51] **Int. Cl.** **B66d 1/02**
[50] **Field of Search** 254/187, 170, 150, 166; 74/425; 308/122

[56] **References Cited**

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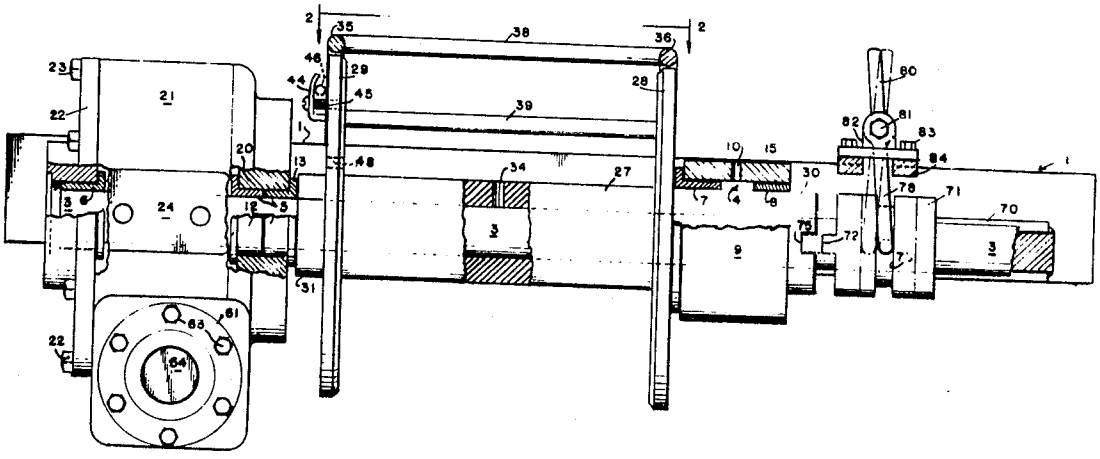
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ABSTRACT: A winch having a main shaft of uniform diameter throughout its length journaled in spaced-apart bearings interconnecting parallel frame members, and a winding drum rotatable about the main shaft between certain of said bearings to thereby provide a rigid assembly which is longitudinally and laterally torsion stiff under all lateral and longitudinal impact forces throughout its length, and wherein the work load stresses are transmitted through the bearings and not to the main shaft, as in other winches I am aware of.



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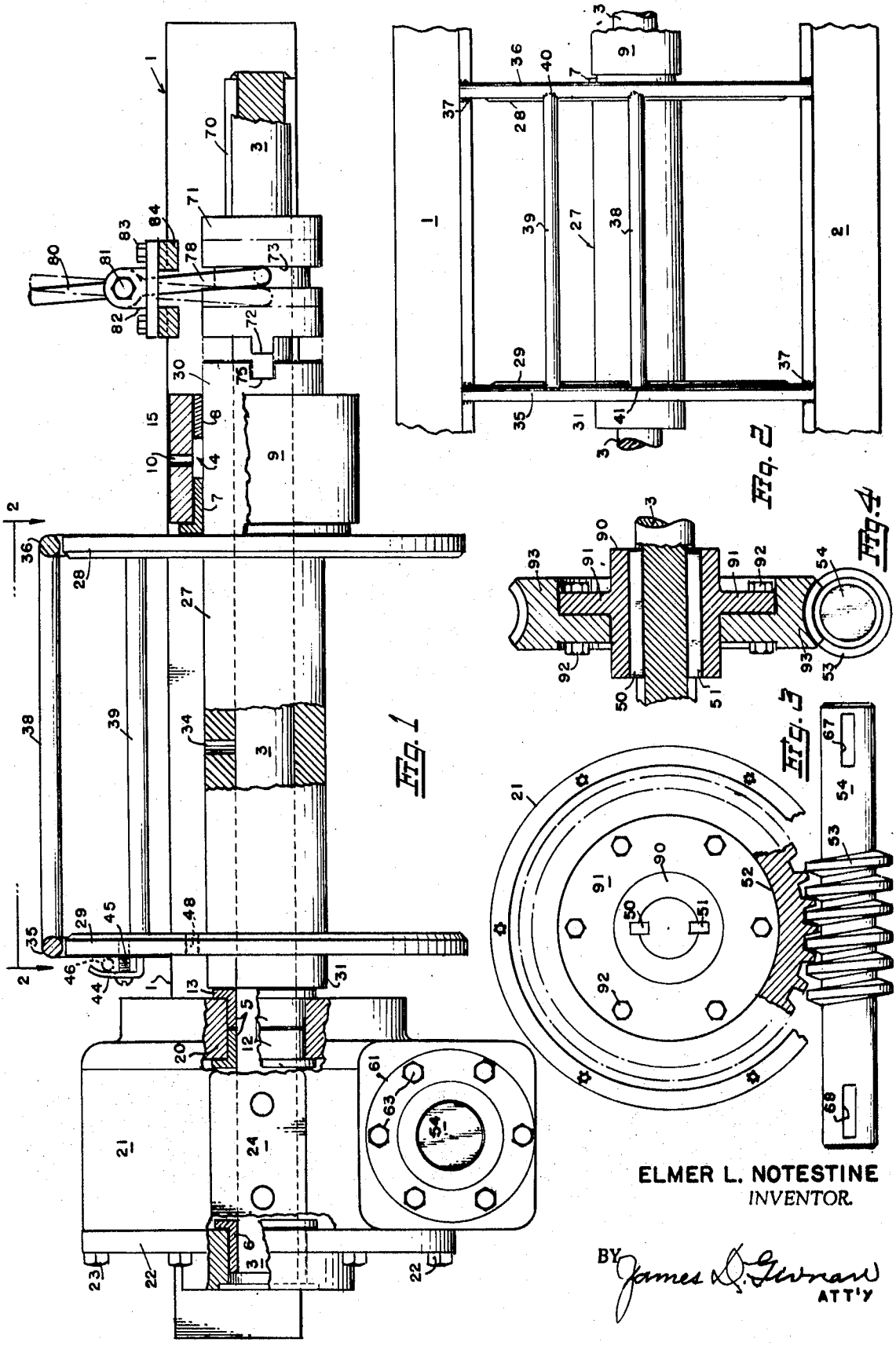


FIG. 1

FIG. 2

FIG. 4

FIG. 3

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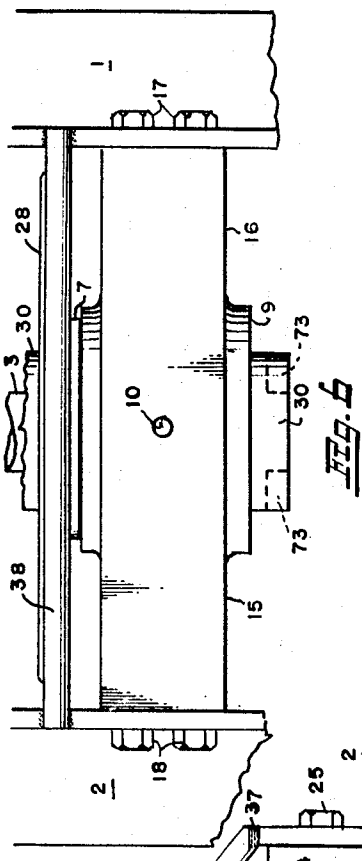


FIG. 6

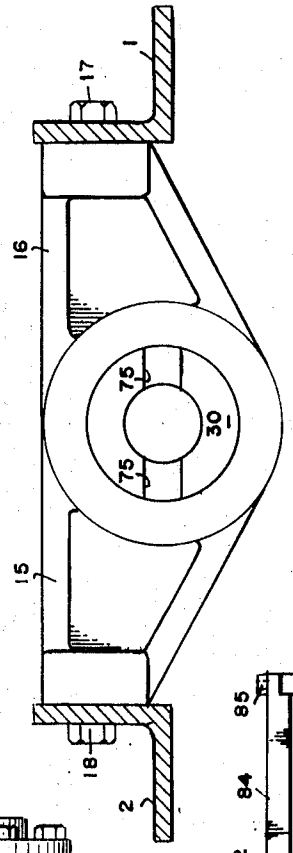


FIG. 7

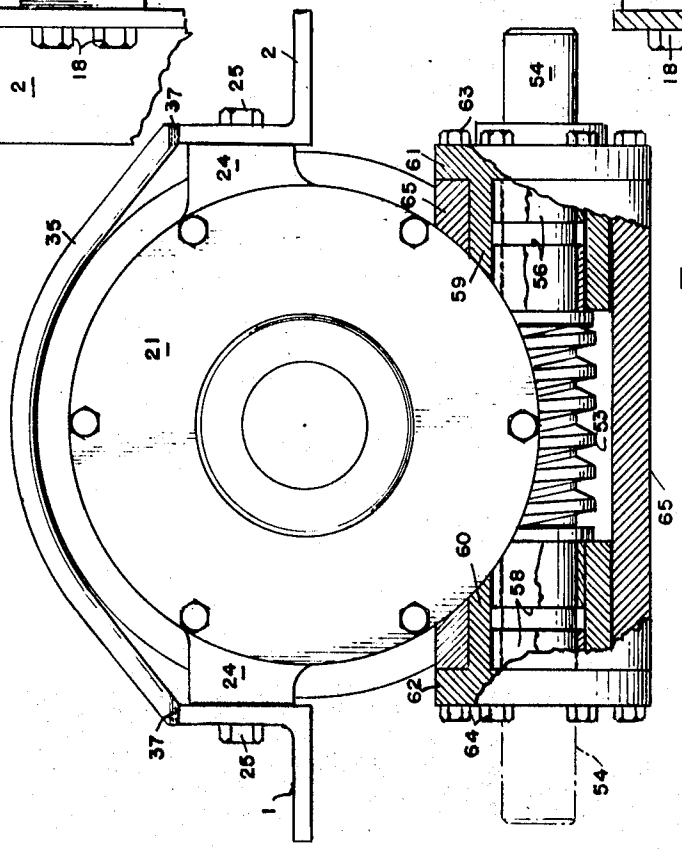


FIG. 5

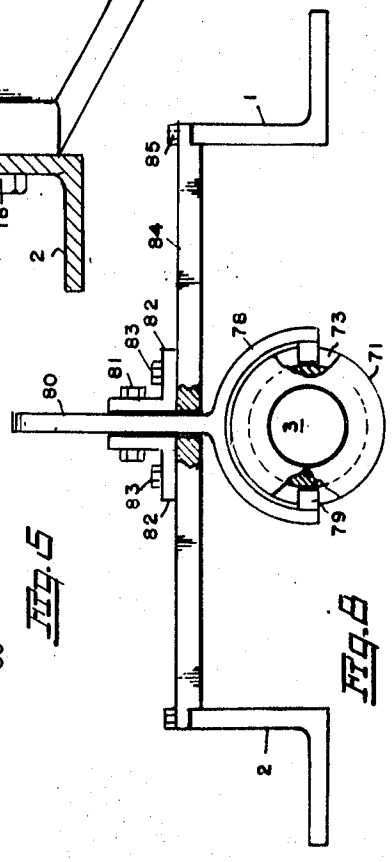


FIG. 8

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WINCH

The objects of the invention are

To provide a winch as above described wherein all of the bearings are so spaced relative to each other as to minimize wear and provided with openings for oil and grease fittings to insure a continuous oil bath at all times.

To provide a winch of the character described wherein the power input to be worm gear and worm wheel in their housing at one end of the shaft is transmitted through the main shaft to a driving dog at the opposite end thereof for selective driving engagement with the winding drum.

The foregoing and other objects and advantages which will become subsequently apparent reside in the details of construction and operation as more fully hereinafter described and claimed, reference being had to the accompanying drawings forming a part hereof and in which:

FIG. 1 is a rear elevational view of a winch and related parts in accordance with my invention, with some parts omitted and some in section.

FIG. 2 is a fragmentary top plan view on a reduced scale taken approximately along the line 2—2 of FIG. 1.

FIG. 3 is a detail view of a power train including a worm gear and a worm wheel.

FIG. 4 is a vertical sectional view through the worm gear and worm wheel.

FIG. 5 is an elevational view of the left end of FIG. 1 with fragments of the gear train housing broken away and parts in section for convenience of illustration.

FIG. 6 is a top plan view of a bearing bracket interconnecting the side members of supporting frame for the winch.

FIG. 7 is an elevational view of FIG. 6.

FIG. 8 is an elevational view of a clutch mechanism near the right end of FIG. 1.

With continuing reference to the drawings wherein like reference numerals designate like parts, numerals 1 and 2 indicate, respectively, front and rear parallel angle sections comprising a frame which may be of any desired length and adapted for securement to any suitable support, such for example, as that provided by the forward end of the frame or chassis of a power driven vehicle.

Reference numeral 3 indicates a main shaft of uniform diameter throughout its length journaled in three main bearings indicated generally at 4, 5 and 6.

Bearing 4 comprises a radial-thrust bearing 7 spaced apart from a radial bearing 8 secured within a housing 9 by a forced fit. Housing 9 has an opening 10 for providing lubrication to its interior between the bearings 7 and 8. Bearing 5 comprises two radial thrust bearings 12 and 13, and bearing is a single radial-thrust bearing, as shown.

Bearing housing 9 is cast integral with lateral arms 15 and 16 bolted as at 17 and 18 to the angle sections 1 and 2 respectively.

The second main bearing 5 is secured by a forced fit within the rear wall 20 of a gear casing 21, and the third main bearing 6 is similarly secured within an end bell or closure plate 22 secured as at 23 to the gear casing. The gear casing 21 is cast integral with two lateral lugs 24 bolted as at 25 to the frame sections 1 and 2.

The frame members 1–2, bearing bracket 9 and bearings 5 and 6 within the gear casing 21 which is bolted to the side members, as stated, comprise a rigid frame structure longitudinally and laterally torsion stiff under all lateral and longitudinal impact forces throughout its length and insures axial alignment of the bearings and hence reduction of shaft friction to a minimum.

Freely rotatable about the main shaft 3 is a winding drum comprising a hub 27 cast integral with flanges 28–29 and laterally extending hub portions 30 and 31. Hub extension 30 is journaled in the first main bearing 4 and the end of opposite hub extension 31 bears against the flange of the radial thrust bearing 13 as shown. The hub 27 is provided with an opening 34 for lubricating purposes. A cable guard comprises two arcuate sections 35–36 welded or otherwise secured at their ends, as at 37, to the top edges of the angle sections 1 and 2.

Crossmembers 38–39 are welded at their ends as at 40–41 to the guard sections 35–36 and prevent uncontrolled backlash of the drum cable. Minimal clearance between guard sections and the peripheral edges of the drum flanges prevent cable overrun and ingress of foreign material between the drum flanges.

A clip 44 is secured by a screw fastener 45 to the outside of drum flange 29 and adapted to secure one end 46 of a cable, not shown, but extending through an opening 48 in flange 29 and wound about the hub 27.

Keyed as at 50–51 (FIG. 4) within the gear casing 21 is a worm wheel 52 enmeshed at all times with a worm gear 53 formed integral with a power input shaft 54 journaled in split bearings 56 and 58 which are secured by a forced fit within cylindrical housings 59–60 respectively, flanged as at 61–62 respectively and thereat bolted as at 63–64 to the ends of a worm gear case 65 cast integral with and arranged at right angles to the bottom portion of the gear casing 21.

From the foregoing it will be readily understood that the shaft 54, key-slotted as at 67–68 at both of its ends may be reversed from its full line to the broken line position shown in FIG. 5. In the full line position the shaft is adapted through proper couplings (not shown) for operational driven attachment to the vehicle engine, not shown.

Keyed as at 70 to the free end of the main shaft 3 as shown in FIG. 1, and movable lengthwise relative thereto, is one clutch member in the form of a collar 71 having diametrically opposed driving dogs 72 at its inner end and provided with an annular groove 73 intermediate its ends.

The dogs 72 are movable into and out of engagement with a companion clutch member comprising grooves 75 in the outer end of extension 30 of the drum hub 27. For effecting such selective clutch engagement and disengagement, I provide a yoke 78 which straddles the collar 71 and carries diametrically opposed lugs 79 at all times engaged with the annular groove 73 in the collar.

The yoke 78 is formed integral with a shifting lever 80 pivotally attached as at 81 to brackets 82 secured as at 83 to a bridge 84 secured at both of its ends as at 85 to the top edge of frame members 1 and 2.

As best illustrated in FIG. 4, the two-piece worm wheel 52 comprises a hub 90, keyed as at 50–51 to the main shaft 3, flanged as at 91 and thereby removably secured as at 92 to a ring gear 93 at all times enmeshed with the worm gear 53 as shown. The hub and integral flange are preferably, though not restrictively, made of ferrous material such as cast iron or steel, and the ring gear 93 of metal alloy such as bronze or the like.

From the foregoing it will be apparent that rotation of the power input shaft 54 and worm gear 53 in a clockwise direction, for example, will impart rotation in the same direction to the worm wheel 52, main shaft 3, and clutch sleeve 71 which when shifted by lever 80 to the broken line position will, by engagement of the dogs 72 with the grooves 75 in the drum extension 30, impart clockwise rotation to the winding drum itself.

The preponderance of any work load applied to the winding drum will be distributed to and absorbed by the three main bearings 4, 5 and 6 and not by that portion of the shaft 3 which extends through the drum.

What I claim is:

1. In a winch including a supporting frame consisting of spaced-apart parallel supporting members and means rigidly interconnecting said frame members at spaced intervals lengthwise thereof, the improvement comprising;

first, second and third main bearings carried by said rigid frame-interconnecting members,

a main shaft journaled in said main bearings,

a rotary winding drum comprising a hollow hub flanged near each end thereof and rotatable about said main shaft,

said hub extending outwardly from both flanges of said drum,

one of said hub extensions journaled in said first main bearing, said main bearing comprising a combined axial bearing and an axial-radial thrust bearing said thrust bearing engaging one flange of said drum, said axial and axial-radial bearings mounted in spaced relation to each other on said hub,

said main shaft beyond the other of said hub extensions journaled in said second and third main bearings,

a worm wheel casing supported by said second and third main bearings, on opposite sides of said casing, said second bearing consisting of two axial-radial thrust bearings with the radial portion of one engaging said hub and gear casing and the radial portion of the other engaging one side of the gear casing only, said third main bearing consisting of an axial-radial thrust bearing engaging the opposite side of said gear casing,

a worm wheel within said casing permanently secured to said main shaft and rotatable therewith,

a worm gear case integral with and arranged at right angles to the bottom of said worm wheel casing,

hollow cylindrical housings of an outside diameter substantially equal to the inside diameter of said worm gear case,

said housings extending into said worm gear case and fixedly secured to the ends thereof,

a unitary power driven worm gear shaft rotatably carried by

said housings,

said worm gear shaft having a threaded portion intermediate its ends,

the ends of said threaded portion of said worm gear shaft fully occupying the space between said housing and thereby in rotating contact with the inner ends of said housings, whereby torsional stresses and longitudinal forces applied to said power input worm gear shaft will be absorbed by said housings, and forces transmitted to said worm gear case will be distributed throughout the entire length of said case and not just to the corners thereof one end of one of said extended drum hub portions having diametrically opposed grooves therein, a collar in slidable engagement with said main shaft, the end of said collar adjacent the end of said one of said extending drum hubs having diametrically opposed driving dogs, a cross-member superadjacent said collar and secured at both of its ends to said frame members, a shifting yoke in engagement with said collar and including a shifting lever integral with said yoke extending upwardly through said cross member and pivotally attached thereto for selectively interengaging said dogs with said grooves to transmit rotation of said main shaft to said winding drum.

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