Dec. 5, 1944. H. F. PARKER 2,364,471

SUSPENDED HOIST

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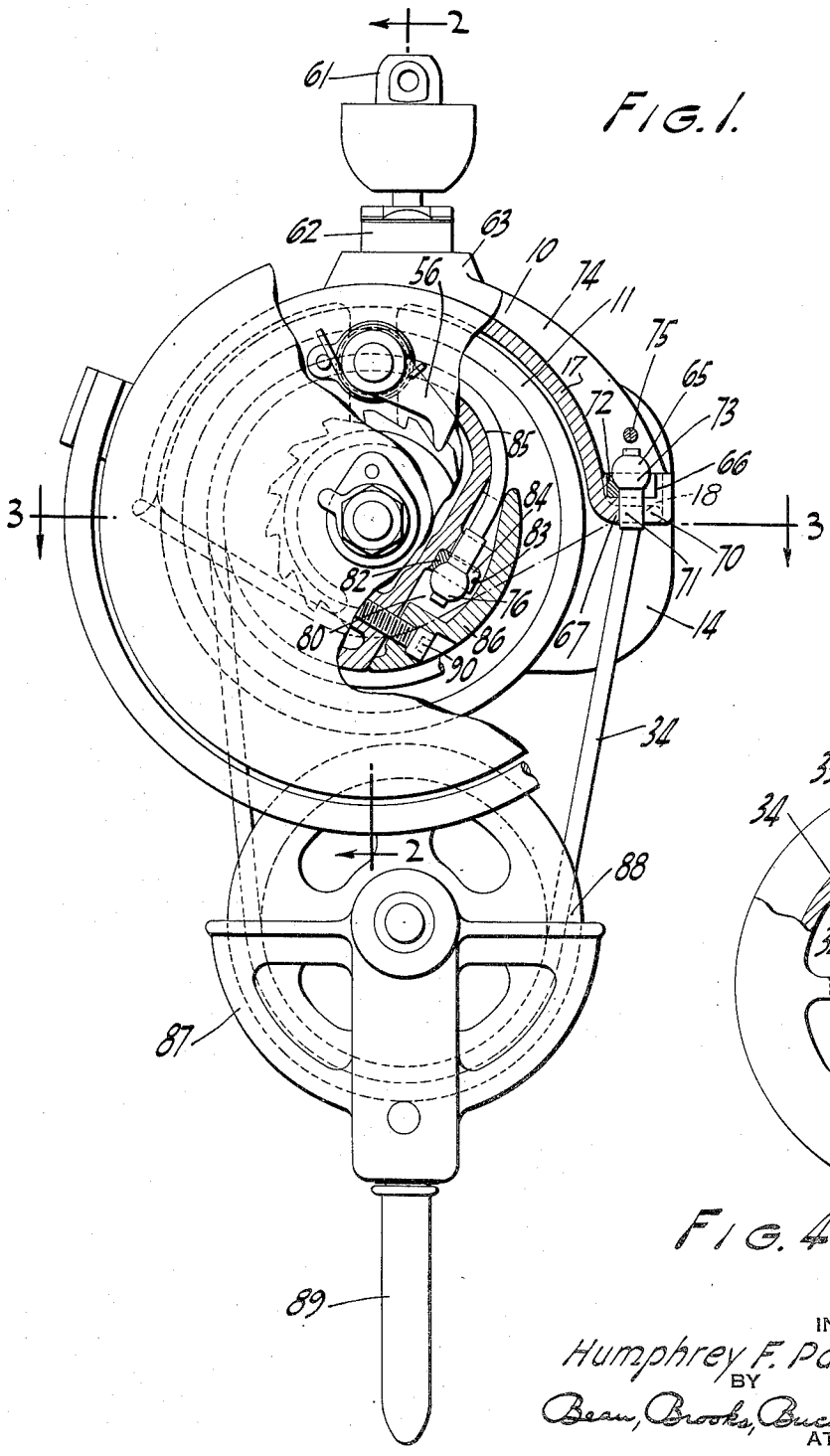


FIG. 1.

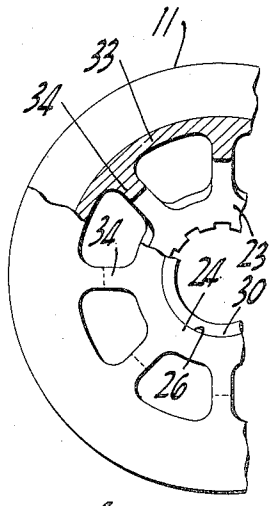


FIG. 4.

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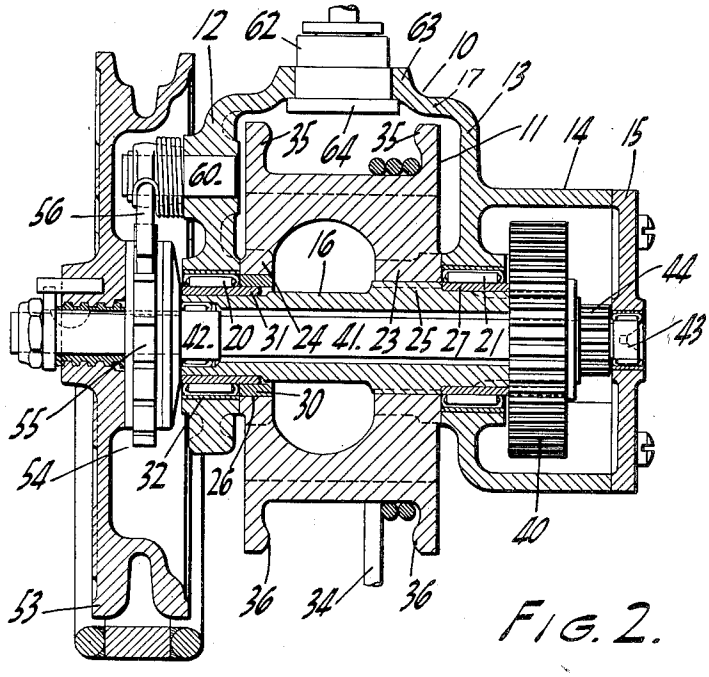
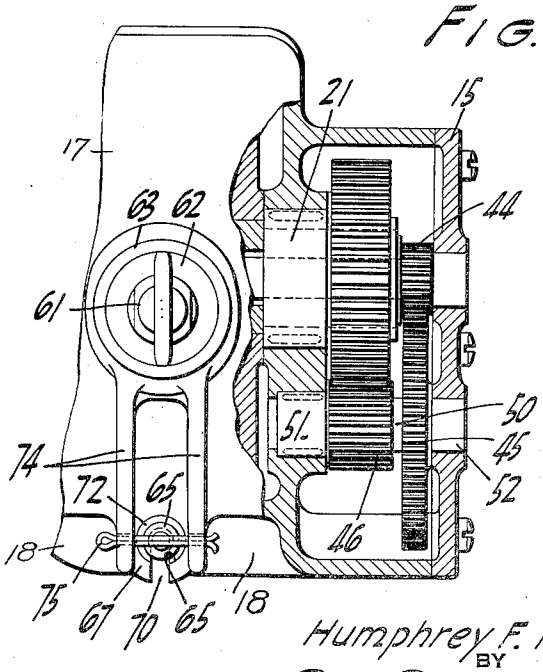


FIG. 2.

FIG. 3.



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SUSPENDED HOIST

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Application May 4, 1943, Serial No. 485,586

4 Claims. (Cl. 254—169)

My invention relates in general to hand hoists and hoist drums, and in particular to a hoist for use upon airplanes and the like.

As is well known to those skilled in the art, any device used as a part of the equipment of an airplane must, of necessity, be compact and light in weight. For this reason the hoists of the present-day art cannot be used because of their bulk and weight.

The principal object of my invention has been, therefore, to provide a hoist which is very compact in design; and one which, because of its design and the material of which it is composed, is exceedingly light for a given capacity.

Another object has been to provide a hoist having a minimum amount of casing and of relatively light cross-section.

A further object has been to unite the suspension means hub with the dead end anchor abutments thereof by means of ribs to reinforce the casing and to strengthen those parts which carry the greatest load.

Another object has been to provide a drum for hoists having a relatively thin periphery, and to reinforce such periphery with interior reinforcing ribs.

Moreover, my drum is provided with two spaced hubs, one of them being relatively short and forming only a bearing support, while the other is relatively long and is provided with suitable keyway means for non-rotatably fastening it to the load shaft.

Furthermore, the drum and casing arrangement of my hoist is so designed to facilitate assembly.

The above objects and advantages have been accomplished by the device shown in the accompanying drawings of which:

Fig. 1 is a side elevation of my complete hoist, portions being broken away for clearness of illustration,

Fig. 2 is a side sectional elevation of my hoist taken on line 2—2 of Fig. 1,

Fig. 3 is a fragmentary plan view, a portion thereof being shown in section, which section is taken on line 3—3 of Fig. 1, and,

Fig. 4 is a fragmentary side elevation of the drum of my hoist, with a portion thereof shown in section.

My device comprises a casing 10 having a longitudinal wall 17 extending over the top only of the load lift wheel 11, thereby reducing the weight of the complete hoist. The casing is of yoke-shaped formation and is provided with integral depending side walls 12 and 13. One of the longitudinal edges of the wall 17 is formed with an outwardly extending flange 18. Carried by the side wall 13 is the gear housing 14 of my device, having a cover 15 secured thereto by suitable means.

The load shaft of my device is represented at 16. This shaft is carried by the casing 10 in suitable anti-friction bearings 20 and 21. The shaft 16 is preferably made of the same light weight material as, for instance, magnesium or aluminum, from which the casing and drum are also preferably made.

The drum is provided with a hub 23 at one end, which is relatively long as compared to the hub 24 at the opposite end. The hub 23 is preferably formed with a plurality of keyways for engagement with the splined portion 25 of the shaft, thereby non-rotatably securing the drum to the shaft. So as to be able to conveniently machine the grooved hub 23, the hub 24 is preferably formed with a bore 26 slightly greater in diameter than the distance across diametrically disposed grooves in the hub 23 so that in machining the aperture in the hub, the broach may be free to pass through the aperture of the hub 24. A reducing ring 30 is preferably pressed into the bore 26 of the hub 24 after the grooving operation in the hub 23 is completed. The inner diameter of the ring 30 is preferably less than the smaller diameter of the grooved aperture of the hub 23 so as to facilitate assembling of the load shaft. The inner race 31 of the anti-friction bearing 20 is extended inwardly toward the center of the shaft and beyond the length of the companion race 32, thereby forming a support for the reducing ring 30 carried by the hub 24. It is preferable to have the hub 23 which connects the drum to the shaft disposed adjacent the gear housing 14, whereby the load is transmitted almost directly to the load gear 40, thereby permitting a reduction in diameter and weight of the other portion of this shaft.

The drum 11 is provided with a periphery 33 which is comparatively light and therefore is not provided with any grooves for the cable 34 which is wrapped about it. Because of the relative lightness of the periphery of the drum it is necessary to reinforce it, and to do this I provide a plurality of arch-shaped ribs 34 which extend across the interior of the drum and terminate at the hubs 23 and 24, thus tying the hubs together and thereby providing a drum structure that is not only light in weight but sufficiently strong to withstand the load placed upon it. The drum is provided at each end with an upstanding

flange 35, each of which terminates in an inturned bead 36, for directing the cable at the end of its travel along the periphery of the drum.

The load shaft 16 is extended through the bearing 21 into the gear housing 14 where it is provided with a load gear 40, secured to the shaft in any suitable way. The load shaft is hollow and extending centrally therethrough is the operating shaft 41 of my hoist. This operating shaft is supported at its forward end within the bore of the shaft 16 by means of an anti-friction bearing 42. The far end of the shaft extends to and is mounted within an anti-friction bearing 43 carried by the cover 15 of the gear housing. Carried by the operating shaft and located adjacent the cover 15, is an operating pinion 44. This pinion is connected to the load gear 40 by means of an intermediate operating gear 45 and an intermediate load gear 46. The gears 45 and 46 are non-rotatably mounted upon the shaft 50, which is rotatably carried at one end by a suitable anti-friction bearing 51, mounted in the casing 10, and at the other end by an anti-friction bearing 52 carried by the cover 15.

The operating shaft 41 is extended forwardly and has mounted upon it the usual hand wheel 53 for the reception of the usual hand chain (not shown). The hand wheel is connected to the shaft through the medium of a Weston brake 54, of well known design. Engaging with the ratchet wheel 55 of the Weston brake is the usual ratchet pawl 56. This pawl is pivotally mounted upon a stud 60 which is carried by the casing 10 of the hoist.

The casing 10 is provided with means for suspending it from any fixed support, and for convenience of illustration I have shown a suspension eye 61, to which any suitable hook or other fastening means may be attached. The suspension eye is provided with a base member 62 which extends into and through a reinforced boss 63 at the top of the casing and which is held in position by means of a flange 64 formed at the bottom of the base member. This reinforcing boss is of one piece and is made integral with the longitudinal wall 17 of the casing. The flange 18 at the lower rim of the longitudinal wall is provided with spaced abutments 67, thereby providing an entrance slot 70 of sufficient width to permit the passage of the cable 34, but not sufficient to allow the passage of the shank 71 of an anchor 65 at the dead end of the cable. The flange 18 is increased in thickness around the slot 70, as shown in Fig. 1, and a pocket 66 is formed in this area to receive a socket insert 72 having a spherical recess formed in its upper surface for the reception of the spherical end 73 of the anchor 65.

Since the casing 10 is relatively thin because of the requirement for lightness in the hoist, the casing is reinforced by means of upstanding reinforcing ribs 74 which are arranged one on the outside of each of the abutments 67, as shown in Fig. 3, and which extend up around the casing to the reinforcing boss 63. These reinforcing ribs are cast integrally with the longitudinal wall 17 of the casing, and their lower ends are connected to the abutments 67. The upper ends of these ribs extend up the side of the boss 63 and are integral therewith thus tying together two of the load sustaining points of the hoist and making it possible to use a relatively light, compact casing. In order to keep the anchor 65 from becoming dislocated from the pocket 66, I employ a cotter pin 75 which is passed through both reinforcing flanges at a point immediately above the anchor as clearly shown in Figs. 1 and 3.

The drum end of the cable 34 is provided with an anchor 76 which is arranged to lie in an anchor recess 80 formed in the periphery of the drum (see Fig. 1) and to have its spherical head engage with a socket insert 82 which rests within a pocket 83 formed in abutments 84 carried by the drum. The end of the cable immediately adjacent the anchor 76 passes over a curved surface 85 which is preferably tangent to the periphery of the drum, whereby the cable will be prevented from being kinked or bent as it passes from the anchor to said periphery. So as to close the anchor recess 82 and to provide a smooth unbroken surface for the cable, a closure plate 86 is provided for insertion in the recess, and this plate is held in place by means of a suitable screw 90 which passes into the drum. The pocket 83 is preferably located at the same end of the drum as the hub 23, thereby connecting the load to the drum at a point over the hub and transmitting it almost directly to the load gear 40, thus permitting the use of a drum of relatively lightweight construction.

The cable 34 of my hoist passes downwardly through the customary hook block 87, having a sheave 88 and a lower hook 89.

Having thus described my invention, what I claim is:

1. A hand hoist comprising a relatively light one-piece yoke shaped casing having a longitudinal wall and integral side walls, a drum housed within said casing and mounted on bearings carried by said side walls, a one-piece reinforcing boss integral with the casing and located at the suspension point thereof, suspension means carried by said casing and passing through said boss, a cable for disposition about said drum, means for anchoring one end of said cable to said drum, an anchor secured to the dead end of said cable, spaced abutment means integral with said casing and extending outwardly near the center of one of the lower edges of the longitudinal wall thereof for directly receiving said anchor, and spaced reinforcing ribs extending across the outside of said longitudinal wall and integral therewith, said ribs being connected to and supporting said abutments from said boss, whereby the relatively light casing will be reinforced over the load bearing areas.

2. A hand hoist comprising a one-piece yoke shaped casing having a longitudinal wall and integral side walls, an outwardly extending flange formed along one of the lower edges of said longitudinal wall, a drum housed within said casing and mounted on bearings carried by said side walls, a one-piece reinforcing boss integral with the casing and located at the suspension point thereof, suspension means carried by said casing and passing through said boss, a cable for disposition about said drum, means for anchoring one end of said cable to said drum, an anchor secured to the dead end of said cable, spaced reinforced abutment means integral with said flange and forming an entrance slot for the passage of said cable, said abutment means being formed with a pocket, socket inserts disposed in said pocket and engageable with the anchor at the dead end of the cable, and spaced integral reinforcing ribs extending across the outside of said longitudinal wall and connecting each of said abutments with said boss, whereby the relatively light casing will be reinforced over the load bearing areas.

3. A hand hoist comprising a relatively light one-piece yoke shaped casing having a longitudinal wall and integral side walls, a load shaft rotatably mounted in suitable bearings carried by said end walls, a hoist drum non-rotatably carried by said load shaft, said load shaft being formed with an aperture throughout its length, an operating shaft passing through said load shaft, a gear housing formed integrally with said casing, a removable cover for said gear housing, said cover being formed with a bearing for supporting one end of the operating shaft, one end of the aperture of said load shaft being formed with a bearing for the support of the other end of said operating shaft, gear means disposed in said gear housing for connecting said operating shaft with said load shaft for operating the latter, means carried by said operating shaft for manually operating the same, a one-piece reinforcing boss integral with the casing and located at the suspension point thereof, suspension means carried by said casing and passing through said boss, a cable for disposition about said drum, means for anchoring one end of said cable to said drum, an anchor secured to the dead end of said cable, spaced abutment means integral with said casing and extending outwardly near the center of one of the lower edges of the longitudinal wall thereof for directly receiving the anchor, and spaced reinforcing ribs extending around the outside of said longitudinal wall and integral therewith, said ribs being connected to and supporting said abutments from said boss, whereby the relatively light casing will be reinforced over the load bearing areas.

4. A hand hoist comprising a relatively light one-piece yoke-shaped casing having a longitudinal wall and integral side walls, an outwardly extending flange formed along one of the lower edges of said longitudinal wall, a drum housed within said casing and mounted on bearings carried by said side walls, a one-piece reinforcing boss integral with the casing and located at the suspension point thereof, suspension means carried by said casing and passing through said boss, a cable for disposition about said drum, means for anchoring one end of said cable to said drum, an anchor secured to the dead end of said cable, spaced abutment means integral with said flange and extending outwardly therewith, said abutment means being formed with an entrance slot for passage of the cable and with a pocket for the reception of said anchor, and spaced reinforcing ribs extending across the outside of said longitudinal wall and integral therewith, said ribs being connected to and supporting said abutments from said boss, whereby the relatively light casing will be reinforced over the load bearing areas.

HUMPHREY F. PARKER.